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PAVING SEWERAGE

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DEVOTED TO THE IMPROVEMENT OF CITIES.

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CLEANING AND LIGHTING,
SANITATION,
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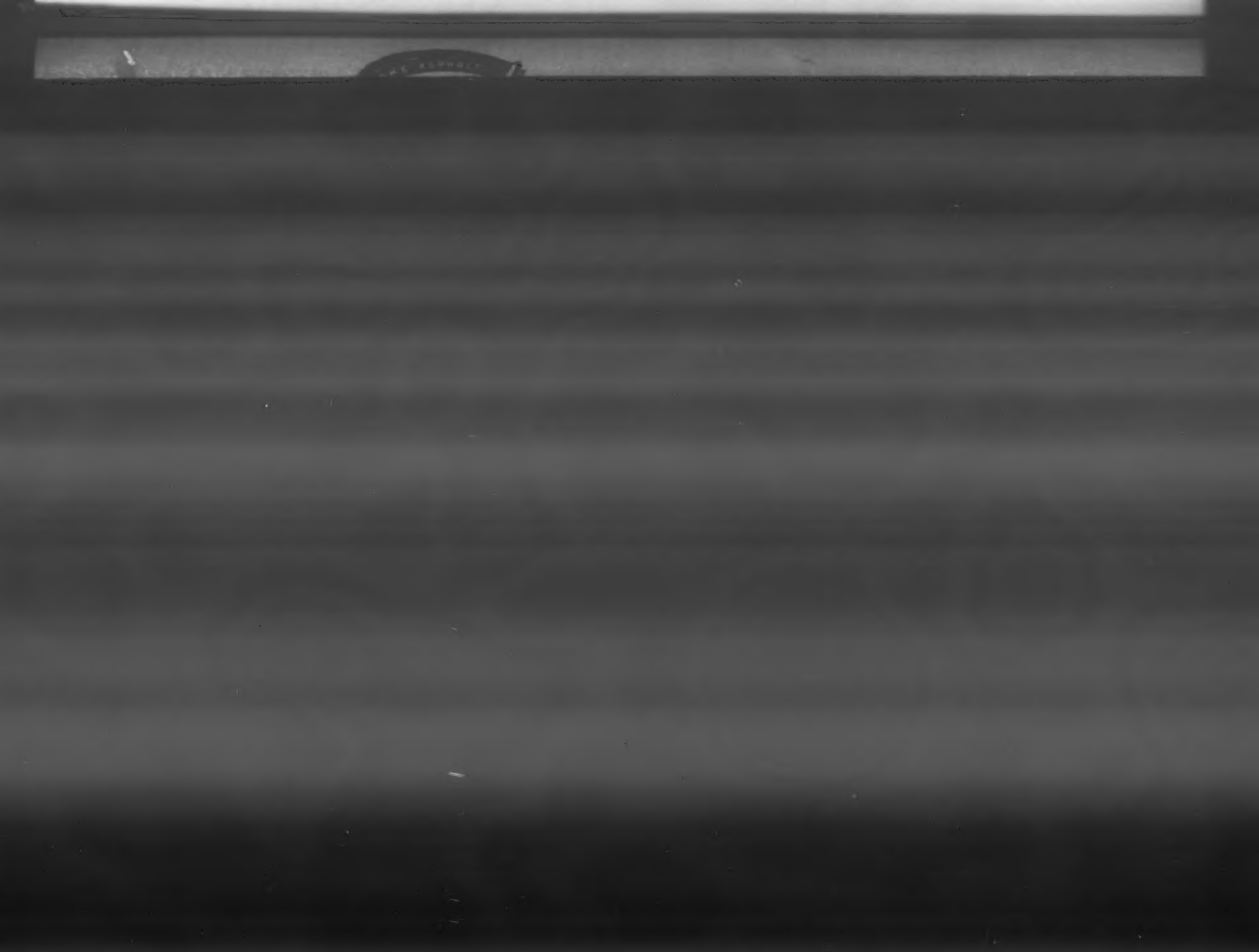


Municipal Engineering

VOLUME XV. SEPTEMBER, EIGHTEEN NINETY-EIGHT. NUMBER 3.

DEFECTS OF CREOSOTED WOOD BLOCK PAVEMENTS.

By F. A. Hetherington, M. E.

There has perhaps never before been such a searching for information and data relating to the making of good roadways and streets as at the present time, and the municipal engineer is apt to be so beset with apparently sound arguments for and against each particular method of street paving that may be proposed, that he is wise indeed who can sift the truths of practice from the errors of theory. It is the purpose of this article to present to the reader deductions drawn from observations of the peculiarities of the wood block pavement as known to the citizens of Indianapolis. These observations may be verified by any who care to go to the trouble of inspection; all may not agree with the conclusions drawn therefrom by the writer, nor does he offer them as final truths in the matters to which they pertain, but simply as a contribution to the literature of street making.

CREOSOTED WOOD BLOCK PAVEMENT ON WEST MICHIGAN STREET, INDIANAPOLIS, SHOWING SWELLING OF BLOCKS.

Indianapolis has had the usual experience of like cities with almost all of the older types of wood block pavements, and even at this time there may be seen on one of

her finest thoroughfares the remains of what was once considered a very fine thing in the way of a wood pavement, now so rough broken that it is carefully avoided by all who are not compelled by necessity to drive thereupon. Since this particular pavement, made of the round block ends of small saw logs, was laid, in 1886, or near that time, there have been put down various other wooden pavements, each perhaps an improvement upon its predecessors, yet none that has yet undergone the test of two years' service has proven satisfactory in all respects. The latest Richard in the field is the kind known as the creosoted block; similar in many respects to any other pavement made of like pine blocks set in like manner; differing mainly in that the blocks are impregnated with a variety of creosote. All other things being equal, then, we may assume that all claims for the superiority of this latter type must be based solely upon the efficiency of creosote as a preventive of rot in—not wood in this case—but wood pavements.

It is a generally accepted fact among engineers that creosote, properly applied, is conducive to the greater enduring qualities of any wood or timber; that it delays rot and the destructive assault of insects. This we shall admit without discussion, in order that we may at once come to the question, What causes the deterioration of wooden pavements? Is it really that the blocks rot and decay, or is there another force at work—a force against which creosote can not avail? Our observations seem to indicate that the latter condition prevails. In order that the reader may better understand the cases here cited the accompanying illustrations are provided.

CREOSOTED WOOD BLOCK PAVEMENT ON WEST MICHIGAN STREET, INDIANAPOLIS, SHOWING SWELLING OF BLOCKS.

Figure 1 is intended to represent the present condition of North Meridian street, the principal residence thoroughfare of Indianapolis. This street was paved in 1895 with rectangular sawed wooden blocks, and when completed, was a splendid example of a smooth, firm pave-

ment. During the three years which have elapsed since this surface was laid the writer has ridden over it from end to end almost daily, and has seen it gradually deteriorate until at the present time its appearance is fairly well represented in this illustration.

The blocks of which this pavement was made were of selected Washington cedar, not treated with any foreign substance. In those portions of the pavement which lie in between intersecting streets the blocks are laid diagonally. That the deterioration of the blocks of this pavement was not caused by damp or rot is distinctly proven by the fact that for a distance of three feet from the curb out, on each side, they are in almost perfect condition at the present time. The blocks at the center are worn to some extent, but extending up and down the street as far as the eye can reach, midway between the center and the curb, are two broad bands of rough chipped blocks.

Reasoning from effect to cause we at once perceive that these two broad bands of rough blocks are the portions of the street that receive the wear and tear of the pounding of thousands of iron-shod hoofs of the horses that are speeded in this formerly favorite roadway.

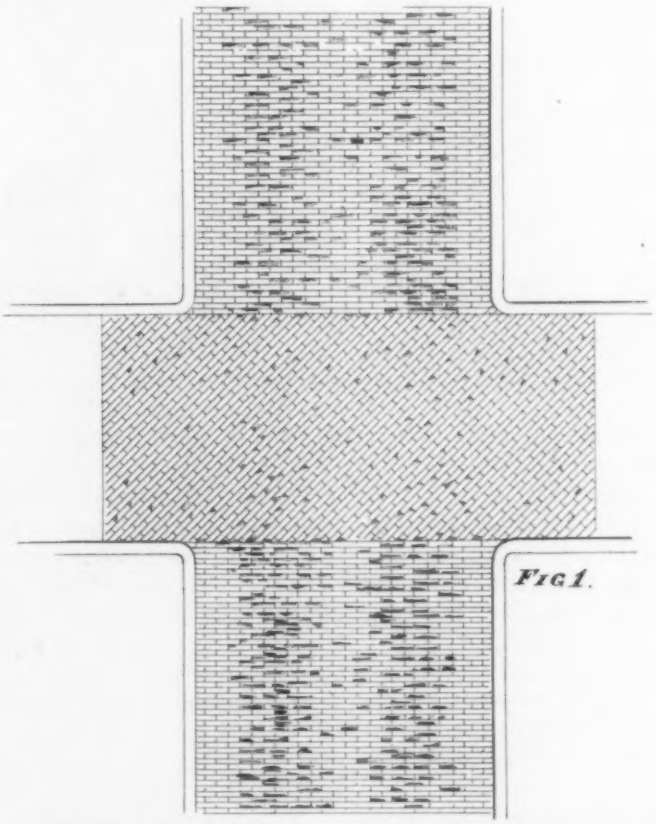


Fig 1.

At the intersection, where there is naturally more travel than between, it is found, strange to say, that the blocks of the pavement are in not nearly so bad condition as in other portions of the street. Why is this? In Figure 2 is illustrated

what we are led to believe is the real cause of the instability of wooden block pavements. It is not decay that breaks down the surfaces; it is the hammer-like blow from the sharp-edged calk of the iron shoe. First, the extreme edge is split off as shown, the split off portion breaking off at a point about three-eights inches below the surface; then comes another blow, and another, each chipping off a small

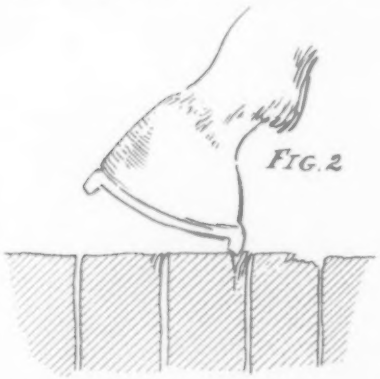


FIG. 2

portion until gradually the whole surface is cut away in patches. In the case of the transversely set blocks the whole unprotected edge of the block is presented for the blow; in the case of the diagonal blocks of the intersection, the calk can seldom strike the block fairly in the line of least resistance, and that is undoubtedly why the blocks of the intersection are in much better condition than those that lie between.

It may be argued that the only reason the edge of the block can be split off is because it is unsupported by the close juxtaposition of the next block, and that it is only necessary to either set the blocks very closely together, or else fill between them solidly with a proper filler. True, that is the correct remedy, but in applying it we establish conditions even more ruinous.

All matter is subject to nature's laws and one of her most inexorable laws is that of expansion and contraction. It is this law that must be considered in constructing pavements of either block, asphalt, or brick. In Figure 3 is illustrated the effect of expansion upon wooden block pavements, or, more specifically speaking, that type of block pavement which is made of sawed rectangular pieces of wood. It is doubtful if any efficient method will ever be devised that will provide for the lengthening of the blocks caused by expansion. It is the effort of these blocks, elbowing each other, as it were, for more room, that causes them to rise from their base and form small mounds or hummocks at the points of least resistance. In some places curb, sidewalk and all are pushed back.

Various experiments have been tried with a view of discovering a remedy for this fault, but without avail. If the blocks are set loosely at first, with spaces between, it will not be a great while until the spaces are packed full and tight with the dust of the street sweepings which sift into them; then comes along a dry spell and each block contracts in size while daily the process of filling in with dirt the ever widening interstices continues; at last comes the penetrating all night rain and the hot sun of the succeeding day beats down upon the surface of the street, heating and still further expanding the damp blocks, up they come, and the only thing that can be done is to remove

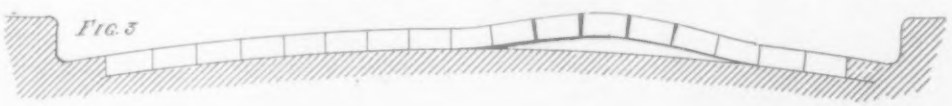


FIG. 3

some of them, cut them down in size and replace, or wait until they dry out and drop back naturally.

In the creosoted block pavement, such as are at present being laid in Indianapolis, the blocks are driven as closely together as possible, in an endeavor to have each block back up its fellow against the destructive blow of the horse's foot, but this method, while causing a gain in one direction, makes loss in another, for the elasticity of the pavement is proportionate to the amount of yielding filler that may be had between the blocks. It is proposed that room for expansion may be provided by leaving room, between the outer row of blocks and the curb, for a filling of sand of the width of ½ inch, more or less; this, however, does not appear to be of much avail, for it soon packs into an unyielding body and is no more compressible than the block itself. The photographic reproduction which accompanies this article represents the surface of a street that is paved with pine blocks, creosoted; the blocks have been down about one year, more or less.

A consideration of the foregoing observations may lead one to the following conclusions:

1st. Wood pavements are destroyed by abrasion, not rot.

2d. Creosoting wooden blocks does not increase their power to withstand abrasion, although it may deter rotting.

3d. No reliable method has yet been devised to overcome the effects of expansion in wood pavements.

4th. Blocks set in lines diagonally to the line of the street will withstand abrasion longer than those set transversely.

AN ANSWER TO CRITICISMS OF CREOSOTED WOOD BLOCK PAVEMENTS.

By Clarence A. Kenyon.

[Mr. Clarence A. Kenyon, one of the ablest and most prominent advocates of creosoted wood block pavements, was accorded the opportunity by the editor of MUNICIPAL ENGINEERING of answering Mr. Hetherington's criticisms. Mr. Kenyon's answer is given below.—EDITOR OF M. E.]

In general, I assume that the foregoing article is intended as an argument against wood block pavement, and especially against creosoted wood pavements. This is evident from the statement that "none that has yet undergone the test of two years' service has proven satisfactory in all respects." The statement is merely the assertion of the writer, without offering any proof. No pavement yet devised may be said to meet all conditions. In that light, no asphalt, brick, wood or granite "is satisfactory in all respects." It is only fair to say that there is less complaint in Indianapolis to-day by the people on the creosoted wood pavements, of defects, than on either asphalt or brick.

The next complaint of the writer is that "wood pavements are destroyed by abrasion (or wear) and not rot." This is really wonderful, so wonderful, in fact, that he goes into great detail to explain just how wear takes place, as though wood pavement is the only thing in this world that wears out. Of course wood pavements wear out; so does asphalt, brick, granite, and so would Harveyized steel. The practical question, it would appear, is

not, will pavements wear out? but which kind will wear out first under similar conditions of traffic, a subject on which the writer says nothing. He commits the fallacy of arguing from a special case to a general one. For example, he observes that Washington cedar (a soft, spongy wood) is wearing faster on Meridian street than it is rotting, and conveys the impression therefrom that all wood pavements will wear the same way. That might be an argument against that kind of wood, as the use of a poor asphalt which quickly disintegrates would suggest the discontinuance of the use of that particular kind of asphalt, but it is no argument against the use of wood or asphalt as paving materials.

It is a matter to be regretted that Indianapolis, like most other cities, has laid some pavements, without a proper selection of material; we have had some poor asphalt pavements and some poor wood pavements, and some poor brick pavements, but these facts by no means prove that good pavements can not be laid with wood, asphalt or brick. Good ax handles can be made of wood, but a good ax handle can not be made of a pine stick, and yet a wood as inappropriate for a pavement as pine would be for an ax handle was laid on Meridian street. Washington cedar is a soft, porous, spongy wood with little strength of fiber, and yet, surprise is shown that traffic wears it. It had never been used before as a paving material. Why Indianapolis should be the pioneer with Washington cedar, no one knows.

Another point made in the article is that "blocks set in line diagonally to the line of the street will withstand abrasion longer than those set transversely." The idea is not new. It is a part of the Indianapolis specifications. Stone and brick pavements are often laid that way both in this country and in Europe.

Again, the writer of the article says that "creosoting wooden blocks does not increase their powers to withstand abrasion, although it may deter rotting." Our government officials have not determined the question which the writer so quickly disposes of, but I quote the results of Dr. Boehme's experiments from Bulletin No. 9, of the Department of Agriculture, p. 227: "Tests of bending strength of the samples showed that those impregnated were stronger by 15 per cent. Resistance to compression was greater by 22 per cent. * * The following results confirming this view are taken from some experiments which were submitted to the British Civil and Mechanical Engineering Society some time ago." Then follows the table of experiments confirming Dr. Boehme's statements.

Howard Constable, C. E., in summing up the experiments of the department, in the report above referred to, says, at page 279, "Preservation, however, materially adds to the natural hardness of timber."

His next point is that wooden blocks expand and contract, by an inexorable law of nature, as does asphalt and so does brick and he might have added, all other matter, but he is ignorant of present knowledge and even anticipates the future by saying, "It is doubtful if any efficient method *will ever* be devised that will provide for the lengthening of the blocks caused by expansion. * * Various experiments have been tried with a view of discovering a remedy for this fault, but without avail." We can provide for expansion in brick, stone and steel construction, and

yet, in all of them, the expansion is much greater than in wood. It is now claimed that by means of a binder the expansion of asphalt is largely taken care of, and waves prevented. Wood is more universally used in construction than any of these materials; the expansion is very slight and is taken care of without the least trouble in all kinds of wood structures. It will be interesting to learn just why it failed and everybody failed, and will in the future fail, to find an efficient method to take care of the expansion of wood when laid with rectangular blocks in a pavement. The statement of the case ought to disclose the error or ignorance of the writer. As a matter of fact, his information is not correct.

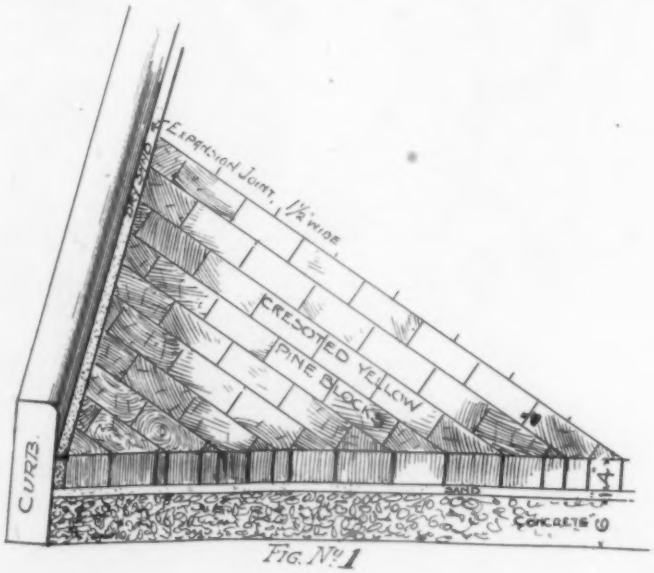


FIG. No. 1

There are several known ways to take care of the expansion. In Galveston, Texas, where they have large areas of creosoted yellow pine pavement, wedges are used. I quote from a letter of City Engineer Peek, under date of July 18, 1898: "We have five blocks of creosoted pine pavement * * * laid in 1874. This road done in 1895: "The margins (1½ inch wide), for expansion left between the wood and granite curbs, to be filled with clean, dry sand and coated over with a film of Portland cement," in the manner indicated in figure No. 1. The method just described is the method practiced in Indianapolis, but prior to this year, there was no provision made for expansion, and, indeed, unless the blocks are laid very close together, there is no necessity for it, as the expansion of creosoted wood is slight.

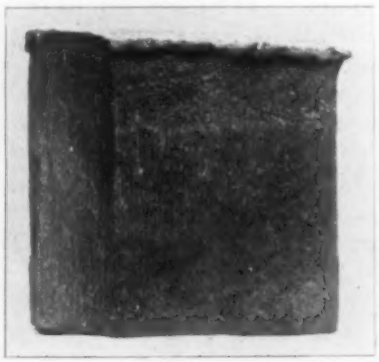
But the contributor says that the method above described "does not appear to be of much avail, for it soon packs into an unyielding body and is no more compressible than the block itself." Where he gets the information to justify that statement, he does not say. He cites no case where a pavement so laid has raised up, and his statement that dry sand will pack itself into an unyielding body by the lateral pressure of expansion, is hardly convincing. One might assume that the pavement in the picture he presents, had the expansive joint above described, for anything in his article to the contrary, but a careful examination of the specifications providing for the paving of that street shows that the pavement was not so constructed. Neither was it pine, as stated, but Washington red cedar.

The accompanying illustration is from a photograph of the Rue de Rivoli, in Paris, the street through which passes about 42,000 horses per day, more than any other street in the world. It is paved with yellow pine blocks creosoted, and the joints are so tight that they can scarcely be seen in the original picture. I was informed that the pavement was about seven years old when the picture was taken. The expansion joint above described was provided, and the officials informed me that they had had no trouble from that source. There are hundreds of miles of these pavements in London, Paris, and other European cities, and they are being extended every year; in fact, more than any other kind of pavement. I heard no complaint made that there was any difficulty in providing for the ex-

WOOD BLOCK PAVEMENT ON RUE DE RIVOLI, PARIS.

pansion. The fact that wood pavements have been in vogue there for over thirty years, and are increasing in popularity, would not suggest that any engineering difficulties had been encountered that had not been overcome.

The Londoners and Parisians are in favor of wood pavements, but not the kind that have been current generally in this country, consisting, as a rule, of round, green blocks, with the sap-wood left on, and often the bark, laid on sand or boards, with gravel in the interstices, the wood of which usually consisted of soft, white cedar that is no more appropriate for a street pavement than a soft brick is for a brick pavement. Is it any wonder they rotted out and wore out? Houses and furniture constructed of such material would be no better than the pavements. But when our government reports show that long-leaf yellow pine is stronger to resist loads and abrasion than oak, and there are several other woods nearly as strong,* it is fair to assume, that, if it did not rot, traffic would not break off the corners in the manner described in the article, with Washington cedar. The accompanying illustration is from the photograph of such a block, creosoted, that was taken out of the center of the roadway in Market street, Galveston, Texas (the main business street), after twenty-two years of wear. It is worn down about one-half an inch, and it will be noted that the traffic did not chip off the corners as described in the preceding article. The reason that the blocks were not so chipped is that the wood was appropriate for the use intended and strong enough to withstand the traffic. In New Orleans there is a section of creosoted yellow pine alongside of a granite pavement, at the entrance of the New Orleans gas-works, under heavy traffic for twenty years, and the granite is worn more than the wood.



CREOSOTED YELLOW PINE PAVING BLOCK FROM MARKET STREET, GALVESTON, TEXAS, AFTER 22 YEARS WEAR.

That treating wood with the heavy oil of coal tar (creosote) preserves the wood from decay, is too well established now to be a matter for contention. Heretofore, the process has been so costly that its use was almost prohibited.

All of the matters that the article complains of that can be said to be objections are matters that proper engineering will provide for. The thing that causes surprise is that in the construction of most of the wood pavements in the past in this country all of the well known rules of wood construction have been ig-

*Result of experiments of Department of the Interior, from "Report on the Forests of North America":

	Transverse Strength.	Resistance to Longitudinal Crushing.
	Kilograms.	Kilograms.
Long-leaf yellow pine..	490	10,074
Short-leaf yellow pine..	443	7,628
Red oak	422	8,172
White oak.....	386	8,133
Norway pine.....	341	7,294

The list includes other woods.
A kilogram is 2 1-5 lbs.

nored. The days of cowhide boots and stone pavements have passed. Comfort and pleasing conditions must now be consulted. It is the latter that appeals for wood pavements, on account of their pleasing appearance, cleanliness, freedom from blinding glare, noise and fine dust. Ask any transfer or livery man and you will find them all in favor of wood pavements.

Wood pavements are a great saving on horses. Loads are more easily hauled over a smooth wood pavement (and they should be laid in no other way) than any other kind. They are more easily and cheaply cleaned than any other pavement. When a wood adapted to the traffic of the street to be paved is selected, properly seasoned, and properly treated with creosote, and laid properly, I believe that such a pavement is as enduring as granite, proper attention being given to repairing. It will not be perfect. There is no such thing. I know of no case where such a pavement as I have described has proven a failure or has had the verdict of "not satisfactory" passed against it, and I do not believe that a well authenticated case can be shown. But green, soft, sappy wood improperly creosoted are errors of engineering and not of material. Now to say that a material which has been used in almost all kinds of construction for thousands of years can not be successfully adapted to street paving, when it has so many desirable qualities for that purpose, would be not only belying history, but a sad commentary on the engineering talent of this or any other country.

MR. HETHERINGTON'S REPLY TO MR. KENYON.

To the Editor of Municipal Engineering Magazine:

SIR—I have looked over the article which Mr. Kenyon has written in answer to my own concerning wood block pavements, and wish to say that it was not my purpose, in giving out the result of some personal observations, to challenge any advocate of that kind of a pavement to a discussion, nor shall I permit myself to be led into one of those profitless arguments that lead to nothing in particular. My article plainly states that it deals solely with the wood block pavements as known to the citizens of Indianapolis. I am not prepared to dispute any assertions made concerning any superior kind of wood pavement in some far away land, well beyond my reach. What I have said concerning the Indianapolis streets is susceptible of absolute proof. If they are deficient on account of faulty engineering, as Mr. Kenyon seems to wish us to understand, that is "another story." I have considered them simply as they are to-day. To a few of Mr. Kenyon's statements I have to say as follows:

First. I drew attention to "the wonderful fact" that wood pavements are destroyed by abrasion instead of decay, simply because the principal argument of the creosote advocates is that creosote prevents decay. I have not yet learned that it prevents the results of abrasion.

Second. I made no statement that the blocks of Meridian street are wearing out faster than they are decaying. I think it is plainly

enough stated that it is not decay that is the matter with them; therefore, they would be no better to-day even had they been creosoted.

Third. Concerning the matter of "axe-handles," I am not considering it; I am discussing street pavements.

Fourth. It is not contended that the setting of blocks diagonally is new. The argument is rather that one of the main reasons why our new wood block streets are better than the older ones is by reason of the builders taking advantage of the fact that blocks last longer when so set.

Fifth. As to the matter of the government's tests of "bending strength," etc., I have to say that these tests have nothing to do with the case at issue; the said tests were made to determine the efficiency of wood for other purposes than paving, in which "bending strength" cuts no figure.

Sixth. As to the matter of the comparative expansion of "asphalt, stone, iron or wood," I have to say that any child knows that of all these named materials wood is the only one that is perceptibly influenced, in the way of expansion, by water. It is said that there was among the quarrymen of ancient days a method of splitting huge blocks of stone by driving wooden wedges into a deep channel cut into the stone in the direction in which it was desired to split the block. After the wedges were driven in tight the channel, or trench, was filled with water; the wood blocks swelled and the rock fell apart. Would iron, stone, or asphalt blocks have answered this purpose?

Seventh. I made no statement that "dry sand will pack itself into an unyielding body;" I have not been considering *dry* sand; I speak of wet sand and wet blocks. It must be also remembered that the sand filler will not long remain pure sand; that it soon becomes mixed with the fine dust of the street, which may be more or less of a clayey nature. True, the sand of the 1¼-in. filler, which Mr. K. advocates, might be protected by a coating of Portland cement, and thus kept clean and dry, but when the expansion of the blocks occurs again what will happen to this cement roof over the sand pile?

Eighth. I have no reply to the statements as to what is done in London and Paris; these are the bugaboos always held up as clinching arguments. Some day I will go over and see about it; at present I am discussing only the pavements of Indianapolis.

F. A. Hetherington.

IMPROVEMENTS IN WATER-WORKS OF AMERICA.*

By Alphonse Fteley, President of American Society of Civil Engineers.

The number of places in the United States now possessing a public water supply, whether under public or private ownership, is nearly 4,000; but, while systems of works increase in number and importance, it would seem that we lack in this country the faculty of properly regulating them as regards the quantities to be furnished. In large cities, with some exceptions, the per capita consumption is in-

* From annual address to American Society of Civil Engineers at Detroit, July 26.

creasing, and in several of them the amount consumed attains absolutely inordinate proportions, although, in some of them, every gallon of it has to be pumped. The old cry that water in our communities should be as free as air is heard from people, who from their intelligence and business habits should know better, and the taxpayer does not stop to think of the result of extravagance in water consumption. More water means more and larger pipes, more capacious reservoirs, more pumping stations, and, in many cases, new sources of supply, with the attendant large outlays necessary to procure them. It also means increased risks. In some cases, as in New York, it becomes a problem to locate water pipes properly in already crowded streets. That there is a large waste of water is admitted by all, but the means of checking it are not generally applied. Objections are raised as to a more extended system of making consumers pay for the amount of water actually consumed, and clumsy and inaccurate methods of estimating the amount and value of the water used are resorted to, which not only would not be tolerated for the sale of other commodities, but would be considered absolutely ridiculous.

The consequences of excessive consumption of water are ominous. Take the case of New York. In 1890 its new acqueduct was put into service, the consumption then being 110,000,000 gallons per day. After nearly eight years, the average for 1897 was 230,000,000 gallons per day, a per capita rate of about 115 gallons. At this rate the new system of water supply begun over ten years ago, and constructed at a very large cost, will soon be insufficient in a dry year, and new sources will have to be developed at much greater cost.

KENWOOD PARKWAY, MINNEAPOLIS.

The large cities of this country, which, located on the sea coast, have

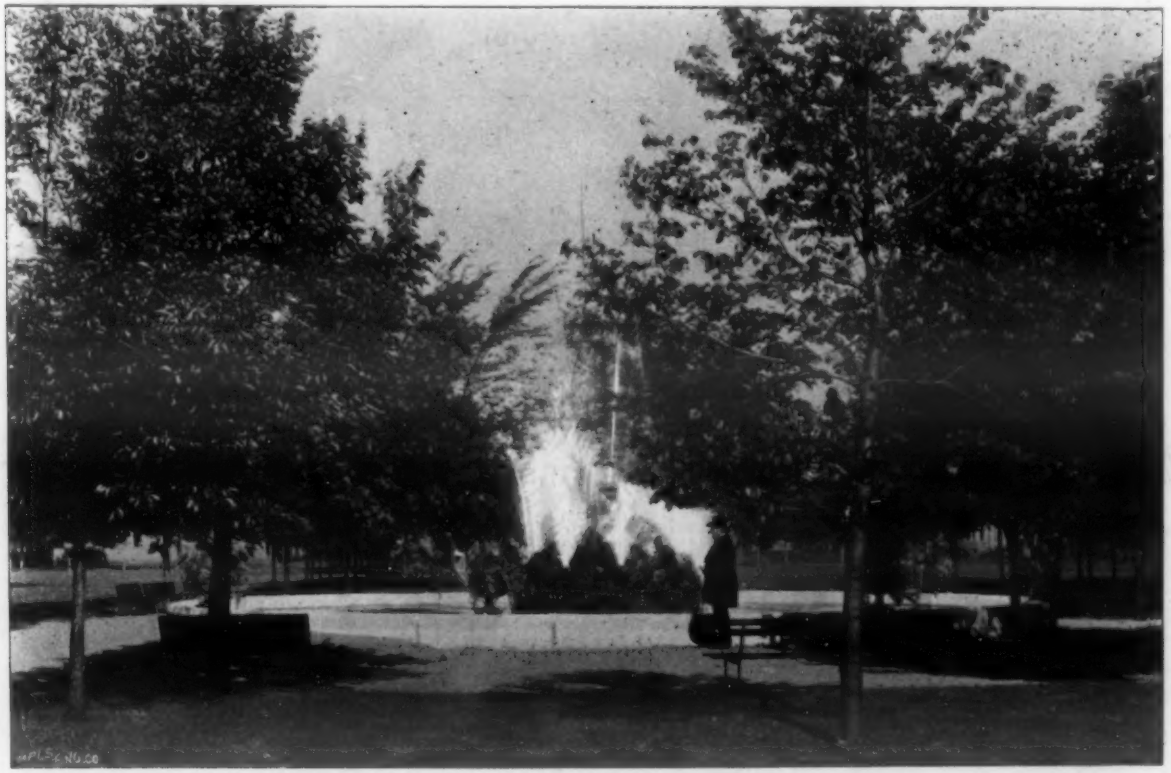
A GLIMPSE ALONG MINNEHAHA PARKWAY, MINNEAPOLIS.

no fresh water within easy reach, have generally taken too great risks in the matter of their water supply, and it is to be wondered at that no harm has resulted from this policy; those especially where the density of the population is great should have more than one system of water supply, and it is to be hoped that this view of the subject may be adopted.

With the advance of sanitary science the need of purer water has been felt, and efforts have been made in many directions to improve public water supplies. Where they are obtained by impounding river waters in storage reservoirs formed by damming the streams, great inconvenience has been felt from offensive tastes and odors, generally produced by the development of microscopic vegetation. Efforts have been made to improve the gathering grounds and the reservoirs, and in a number of cases, especially in and about Boston, the soil, down to the underlying sand and gravel, has been removed at a large expense, to the great benefit of the impounded waters. In cases where the same inconveniences have been experienced in underground waters pumped into reservoirs exposed to the light, a notable improvement has been produced by covering the reservoirs.

Much attention has been given in late years to the study of filtration processes. Thirty years ago an eminent member of this society, and one of its late presidents, prepared, for the benefit of the St. Louis waterworks, a report on "Water Filtration," which, for many years, was the most valued text-book on the subject. It was then thought, and it was so maintained for many years, that hardly any chemical action took place in the filtering of water, and that the main function of the filter was to retain the particles suspended in the water, very little action taking place on matters contained in solution. Little was known of the influence of filters on bacterial life. Within recent years, however, especially through the efforts of the Massachusetts State Board of Health in conducting at the experimental station at Lawrence its well-known series of experiments, results have been obtained which have revolutionized the theory of water filtering. Radical chemical and biological changes have been found to take place in the operation of filtering, and bacterial life has been recognized as the most potent instrument for the conversion of organic matters into mineral compounds, while it operates at the same time as an agent of almost complete self-destruction, provided, of course, that the construction of the filters, the selection of the filtering materials used and the subsequent care of the apparatus are such as to properly carry out the results indicated by the laboratory experiments.

A number of different materials have been recommended and used as filtering media with varying success; the most extensively used have been sand and gravel. Sand filters have been in use in Europe for many years, long before the full measure of their usefulness was known, and the modern applications of the system have been highly instructive. We all recollect the striking results of the differences in mortality in Altona and Hamburg during the recent epidemic of cholera, when the first named city, with a water supply polluted by sewage, but filtered, showed only sporadic cases, while in Hamburg the water supply, less polluted, but not filtered, was recognized as the cause of the heavy mortality re-



A FOUNTAIN IN LOGAN PARK, MINNEAPOLIS.

corded. No large systems of what may be called gravity sand filters exist in America, but important communities have been recently and are now making extensive experiments with a view to building some, and in one instance at least, in Albany, a system of filters on a large scale is now under construction.

In mechanical filters, in which various filtering substances, mainly sand, are used, coagulants are generally used to eliminate a large portion of the organic and other matters contained in the water, and sufficient pressure is applied to force the water through the filtering medium so as to cause a flow of water larger than through gravity filters, per unit of area. They have been used for years and have recently been so perfected as to be reported by their inventors as capable of successfully competing with gravity filters in cost and in efficiency. Two very important series of experiments have been made by large cities to investigate the merits of the mechanical filter. Further developments and added experience will evidently be needed to decide the question. From reports made by capable experts in behalf of communities in search of advice for the purpose of constructing filtering apparatus, it appears that the choice between the two systems, in many cases, must be determined by local circumstances, depending mainly on the cost of the filtering materials and on the quality of the water.

The public appears to realize now, more than ever, the desirability, if not the absolute necessity, of procuring purer water, and the close connection between pure water and improved public health is better understood by public bodies. From an economical standpoint alone, when considering the commercial value of each human life, the saving effected by diminishing the mortality would represent a large capital.

Construction has been favored by the decreasing price of iron and steel. The price of cast-iron pipes, especially, has been never so low as it is at present. Steel riveted pipes, for the conveyance of water from the source of supply to the point of consumption, in recent years, have been introduced more liberally in the east. For long distances, with large diameters, under heavy water pressure, especially when few connections have to be used on the way, these pipes are as much superior to cast-iron pipes as the steel substitute is to the old cast-iron tension member of a bridge, and it is not doubted that they will be ultimately used to the exclusion of others, but, unfortunately, although similar pipes made of wrought iron have been successfully used for years on the Pacific coast, and elsewhere, it can not be said that the coatings used to preserve the metal from oxidation are entirely satisfactory. The rivets used for fastening the pipes and lapping joints impede the flow to a certain extent, and a pipe has been devised, the fastenings of which are entirely outside, and provide the pipe with a smooth bore. The great improvement in steel-welded pipes of large diameter will also remedy that defect to a large extent. An order is reported of several thousand tons of welded pipes to be made of Siemens-Martin mild steel, 24 feet long and 42 inches in diameter, for the Birmingham water-works. The possibilities of steel pipes are well illustrated by the proposition to convey a much-needed supply of water, of 5,000,000 gallons per day, to a mining district of Western Australia, by means of a pipe 30

A VIEW OF THE BICYCLE PATH IN MINNEHAHA PARK, MINNEAPOLIS.

inches in diameter and 328 miles long.

The construction of water-works and of irrigation works has rendered necessary, in recent years, the erection of many dams for the impounding of water, a number of them being of great height. Few new principles of construction have been introduced, but improved methods for the building operations have been resorted to, thereby reducing the ultimate cost and the time necessary for the completion of the structures.

The solid stone masonry section, on the general plan originally introduced by the French engineeers, has been accepted in many places; the general practice now being to use large stones with the necessary filling of spawls instead of the uniform small-stone masonry formerly adopted and even recommended by eminent engineers. Elsewhere, concrete masonry has been adopted, this course being generally indicated by local circumstances, such as the high cost of, or even the lack of, stone in the vicinity. In recent instances of concrete dams slight vertical cracks have developed which have been less frequently found, if at all, in well-built stone masonry, owing, probably, to the more thorough bonding of the mass by means of the interlocking of heavy stones. In the western part of the United States rock-filled dams have been built, the imperviousness of the structure being procured by the construction of core-walls, by the building of a timber lining on the up-stream side or by other devices. The earth dam continues to be universally used, parts of India and the United States showing recent instances of this mode of construction for high dams, mostly with the aid of puddle, or masonry and concrete core-walls. A peculiar core, formed of thin sheet iron, used in connection with a recent rock-filled dam in California, is worthy of notice, if not of imitation.

It is to be regretted that theoretical calculations can not be accurately applied to the computations of the stability of dams. The distribution of strains through such masses is not well known; moreover, the diversity of the materials used, the unavoidable lack of uniformity in the labor employed, the different times of the year in which the work is performed under varying temperatures, are all elements which can not be accurately analyzed, although they can be provided for by the introduction of the too often necessary margin of safety. Experience must here come to the rescue of the designers, and dictate the necessary precautions to be used in accordance with known precedents. Especially is this true of the designing of earth dams, for which, in almost every instance, a careful study must be made of the particular materials at hand for construction

The uncertainties just alluded to have been eliminated in the design of a dam of moderate size, the building of which has been recently reported. It is formed of steel columns and struts reposing directly on the bottom of the valley, the up-stream side being formed of steel plates rendered water-tight by the application of a bituminous coating. It is possible that in many instances the cost of such a design would be too high for practical purposes, and some of its features may not be unobjectionable, but it is noteworthy.

Many dams of importance have been recently constructed, or are in process of construction, or of preparation. The Periar dam, in the Province of Madras, 173 feet high,

A VIEW OF THE "THREE DRIVES," NEAR LAKE CALHOUN, MINNEAPOLIS.

was completed in 1893, under exceptional difficulties, for irrigation purposes. The dam built for the water-works of the city of Remscheid, Germany, was also recently erected. In the masonry dam of La Tache, in France, the old French practice of using such small stones only as two men could carry has been continued, although convenient quarries were at hand. The new Croton Dam for the water-works of New York, to be of masonry and earthwork, a structure of great height and involving the laying of over 600,000 cubic yards of masonry is well advanced.

In the states of California and Arizona especially, a large number of dams, mostly for irrigation purposes, have been recently completed or are being erected. The Upper and lower Otay dams, one of them provided with a thin steel core, are important in size. Several masonry dams in Arizona, of great height, may be mentioned; one of them to be 250 feet high above foundation, and to form a reservoir of the enormous capacity of 1,020,000 acre-feet. La Mesa dam, in California, was built with materials transported and deposited in place by flowing water, by the process known to miners as "ground sluicing." Another, to be 130 feet high, is expected to be built by the same method. The Louisa Needle Dam, built for the regulation of the Big Sandy River, Kentucky, recently completed, is remarkable from the fact that it sustains a head of water which considerably exceeds that supported by any other dam of the trestle or wicket type yet constructed.

As the needs of water supply and irrigation call for higher dams, the reservoirs formed thereby are obviously increasing in size, and figures are now being reached as to reservoir capacities which recall the size of the great ancient reservoirs, the knowledge of whose existence has been transmitted to us by tradition, if not by history. The idea of the restoration of the great compensating reservoirs of the Nile, spoken of some time ago, does not appear to be any longer entertained, but the erection of two dams across the river, with a proposed storage of 266,000 million gallons, for the purpose of regulating its flow, is now being seriously contemplated, if not already started. The system of compensating reservoirs for the Mississippi Basin is well under way.

VIEWS OF MINNEAPOLIS PARKS.

Some new views of scenes in and near Minneapolis parks, obtained through the kindness of Mr. Frank H. Nutter, city park engineer, appear in this number. The park system of Minneapolis, which has been described in a previous number, is one of the most beautiful in the country. The original plans contemplate an enlargement of the present system by the acquisition of much land that the city has up to this time not been able to purchase or improve. A small tract of ground was added during the last year, and some minor improvements have been made, but no notable advances were made in the development of the general plan. The present system, embracing the parkways and drives of Lakes Calhoun and Harriet, Minnehaha, Logan, Loring, Riverside, Oak Lake,

SUMMIT OF KENWOOD PARKWAY, MINNEAPOLIS. LAKE OF THE ISLES AND LAKE CALHOUN IN THE DISTANCE.

Elliott, Fairview and Powderhorn parks, is enough for the present needs of the city, but the great plan originally devised by Mr. Cleveland, the landscape architect, should be carried out by the city.

STREET LIGHTING AT MUNICH WITH INCANDESCENT GAS LAMPS.

Some information is furnished by Dr. E. Schilling, in an article in the *Journal für Gasbeleuchtung*, regarding public lighting of Munich, capital of Bavaria, with a population of about 250,000, by means of incandescent gas lamps. He says that, owing to the principal thoroughfares of the city being lighted by electricity, the higher grade of illumination thus produced made it almost obligatory that in the neighboring gas-lighted streets the lighting effects should be heightened. In consequence, the municipal authorities determined that all public lamps should be furnished with incandescent burners. The beginning was made in the spring of 1897, and all the gas street lamps, of which there were 5,015, were equipped by October 1st of the same year. This made it possible that, between the latter date and April 1st, 1898, by close observation a pretty accurate idea could be had as to the cost of the system on a large scale; and especially the cost of operating and maintaining the same.

The principal item of expense was found to be the mantles, and that, indeed, had the greatest influence upon the total cost. Before inaugurating the incandescent gas system of street lighting circular inquiries were sent to a number of cities, with the result that there appeared to be a considerable diversity of opinion concerning the number of mantles required for renewals per annum.

The replies received gave all the way from 2 to 15 as the number necessary. "Doubtless," remarks the author, "the quantity used is affected somewhat by local conditions, according as there may be more or less traffic on a street; or as perhaps the lamps may be supported, either on posts or on brackets fastened to the walls of adjoining houses; or as the attendance may be good or indifferent. But under normal conditions such differences as those mentioned can scarcely be thought to exist. * * * We found, however, that in calculations with reference to this sort of lighting, five mantles, on the average, should be figured on as required per year. That number includes the original mantle put in with the first installation."

The author then goes on to say they found that a trifle more than 2 chimneys and 4½ mantle-holders per year would be the average used for each lamp; and this, whether the lighting was only half or all night. To operate and maintain this plant of 5,015 burners required the services of 1 superintendent, 9 mounters and 12 helpers.

"On the whole, the streets were much better lighted than when the old slit-burners were used; and, in fact, the illumination compared favorably with the electrically-lighted streets. Further, the incandescent gas-burner street-lamps effected quite a considerable saving for the city and the company."

GARBAGE DISPOSAL IN DETROIT.

Dr. Walter Kempster, health commissioner of Milwaukee, in his annual report, gives a description of garbage disposal at Detroit by the reduction process controlled by the Detroit Liquid Separating Company, as follows:

At the present time the amount of garbage collected and disposed of amounts to about seventy tons per day, which rapidly increases during the summer season to over ninety tons per day. The garbage is being collected either daily or twice or three times a week, according to the districts, in close, water tight, iron boxes, similar in form to those used in Milwaukee, each having about one and a half tons capacity. These boxes when full are delivered at the stable and sheds of the company, located in the southwestern part of the city, near the railway tracks. Here each load is weighed, after which, by means of a traveling crane, the boxes are raised from the wagon trucks and transferred to flat cars, constructed to receive these boxes in two tiers of ten in each tier. On the average three such cars are loaded each day, except Sundays; they are switched out by the railway company during the night and delivered next morning at the disposal plant, about twenty-two miles distant from the city.

The boxes were kept closed and the garbage left undisturbed there-

NORTH HIGH STREET, COLUMBUS, O., PAVED WITH ASPHALT.

in, no offensive odor was noticeable at the shed where the boxes were transferred from the wagons to the flat cars and were allowed to remain until night. As each wagon is relieved of its box, an empty box, previously washed, is placed upon the trucks and the same is ready to be sent out upon its trip of collection. The company owns all wagons, boxes, cars and horses.

At the disposal plant, situated at French's landing, where the Wabash railroad crosses Huron river, the boxes are lifted from the flat

cars and conveyed by a traveling crane to the top floor of the works, where the garbage is dumped on the floor and then shoveled by hand into the top of steel digesters, or cooking tanks, until these are filled.

There are nine of these tanks, each of about five tons capacity. These digesters consist of vertical, circular iron tanks, with an opening at the top to receive the garbage, which opening, when the digester is filled, is securely closed by an iron plate firmly screw-bolted down to the tank. The bottom of the tank is somewhat cone-shaped, a short distance above which a discharge opening is provided through the side of the tank. Below this opening and extending across the tank is a perforated false bottom. Within the tank and resting upon this false bottom are three separate cylinders, having double walls, closed on top, open at the bottom and perforated at the sides. The larger cylinder is very nearly the diameter of the tank. The next one is somewhat smaller than this one and is situated inside of it, and the last is still smaller, situated inside of the second cylinder.

After the tank has been filled and closed, steam is turned into the tank and the garbage cooked for a period of six hours, thoroughly digesting the same. During the cooking process, steam and gases are allowed to escape through a pipe from the top of the tank and are condensed by means of cold water, sprayed in a pipe and conveyed thence into a barrel, from whence both water and condensed steam are drained into the river. This water is fairly clear, possessing a peculiar lemon oil smell.

After the cooking process is completed, steam at a pressure of 80 pounds per square inch is forced into the tank from above and also from below. The liquid from the garbage is then forced out by means of the steam through a pipe under the perforated bottom. The steam pressure is continued on the tank for a period of four or five hours, during which time nearly all the liquid and grease are squeezed out of the material, leaving about 30 per cent. of the original garbage in weight in the tank. This material, called tankage, is withdrawn through the side opening to the floor and is conveyed by wheelbarrows to an upper floor, where it is shoveled into steam jacketed dryers, in which the material is further dried for about two and a half hours, leaving about 15 per cent. of the original bulk in a dry, homogeneous, brown mass. From these dryers the material is taken to the mills, ground up, screened, and then stored in the sheds as a fertilizing material. The material drawn from the digesters, after having been pressed, has a slightly sweetish, though inoffensive smell, similar to the steam vapors in a kitchen. The pressed-out water and grease are separated by means of separating boxes, the grease collected in a barrel and the water run off as a dark brown effluent into the Huron river. This effluent rapidly colors the water in the river and, though it may not be objectionable on sanitary grounds, yet is highly objectionable because of its color.

The special features to be recommended at Detroit are the methods of collecting and transporting the garbage to the works, without breaking bulk, and the pressing out of the liquids in the digesters, by means of steem at boiler pressure.

THE QUESTION DEPARTMENT.

[By Charles Carroll Brown, M. Am. Soc. C. E., for MUNICIPAL ENGINEERING.]

DISCHARGE OF WATER PER HOUR FROM DIFFERENT SIZES OF PIPE.

A water pipe is 3,000 feet long; inside diameter for 200 feet is 6-inches; 2,800 ft. is 4-in. Water enters 6-in. pipe under 6 feet pressure; pipe has fall of 64 feet in the 3,000, is smooth and not corroded. What quantity of water should it discharge per hour?

Where can I secure a book of tables answering such questions?

What is the simplest formula for calculating such discharge with reasonable accuracy.

I. C. Clark, Kent, Wash.

Two recent books answering such questions are Freeman's "Graphical Solution of Hydraulic Problems" (Wiley, $2.50) and Weston's "Friction of Water in Pipes."

Freeman uses the formula:

$$Q = Ac\sqrt{rs}.$$

A being the area of pipe,

c an empirical constant,

r equal to one-fourth the diameter of the pipe, and

s the head in feet divided by the length of pipe.

Weston uses the same formula, except that he has derived an expression for c which fits the observations he has made very closely.

The tables in Mr. Weston's book will give the discharge under the conditions stated above at more than 175 gallons a minute, or 10,500 gallons an hour, but not so much as 180 gallons a minute.

Bad condition of pipe, and bad profile of pipe line would both reduce this flow.

HOW TO STOP THE LEAKING OF A WATER PIPE.

Which would be the best way to keep a pipe from leaking until I could get a lead joint run?

James Baker, Palouse City, Wash.

A method which works fairly well is to wrap the joint with several turns of rope, taking pains to have the turn next the joint in such position that it can crowd against the leak, and so arranging the other turns that when a rod is put in the slack and twisted, these turns will force the first turns hard against the joint. Each pipe foreman has his favorite method of solving this problem and we should be glad to publish descriptions and diagrams of such as are simple and successful.

ELIMINATION OF IRON FROM WATER.

We get water from the Missouri river bottoms from wells sunk to bed rock, and it is clear and cool, but has much iron in it. What is the best method to get the iron out of the water?

Wm. Pickering, Richmond, Mo.

The best method in any particular case can be determined only by careful chemical examinations of the water under all its various conditions. If the water is clear when pumped and afterwards leaves a reddish deposit, it is probably due to the presence of soluble compounds of iron which are made insoluble by absorbing oxygen from the air, or to the presence of a small amount of iron and of crenothrix, a water plant, which thrives in such water. In the former case thorough aeration followed by sand filtration will improve the water. In the latter case filtration at the works might be sufficient unless it were not complete, or were done too promptly after pumping, in which case further growth of the plant might take place in the mains. Filtration at the time and place of use is most satisfactory in such case, preceded by aeration there or at the works if found necessary. For any purpose except laundry, or some manufacturing operations the aeration may be sufficient in the former

case. The iron in water from such sources is usually from organic sources, and the amount may vary with the supply of water and of organic matter to the vein. It may therefore be necessary to vary the treatment from time to time.

LAYING PAVEMENTS OVER RECENTLY-MADE SEWER TRENCHES.

Will you be kind enough to refer me to any literature bearing upon, or quote specific instances of the evil effects of, laying pavements over recently-made sewer trenches?

Alexander Potter, New York City.

There is little literature on this subject. There are many short references to the methods of entering pavements with trenches in city engineers' reports—*e. g.*, Indianapolis, Jan. 1, 1895. Most engineers have, however, recognized the impossibility of a new pavement producing such conditions that can be laid on ground entirely undisturbed, and now limit their efforts to securing as thorough filling of trenches as possible. Experience has shown the possibility of securing such good work in filling trenches that, with the concrete foundations now demanded, the number of defective spots due to unequal settlement is reduced very nearly to zero. There are exceptional soils where this result can, perhaps, not be attained, but there are very few instances of this sort. A long training, to be obtained only in a large city with many pavements and much work, seems to be necessary to teach the methods of filling trenches thoroughly. No city without pavements has any plumbers or street foremen and workmen with any idea of the proper methods of filling trenches. Various materials require various methods, and all demand thorough work. Time will be spent better in teaching the art of filling trenches than in arguing for the postponement of construction until trenches have settled.

Poorly filled trenches settle for months, and sometimes for years, so that no safe time for beginning the pavement can be set. A heavy roller properly used will find the defective trenches more surely and more quickly than natural settlement.

See first-class city specifications for plumber's openings of streets for methods. Two interesting papers and discussion before the New England Water-Works Association will be found in the journal of that body for March, 1898.

CONCRETE ARCH FOR HEAVY TRAFFIC SIDEWALK.

Would it be practical to construct a concrete arch, say 20 feet long, and 5½ feet span, with a finished or a corrugated top surface, over a portion of a sidewalk that would stand the traffic of a two-horse steam fire engine? Would a half or quarter circle be better?

Dickerson Paving Co., Chester, Pa.

Unquestionably such a construction would be practical, either wholly of concrete or with a combination of concrete and steel. Either a quarter circle or a half circle can be used, proper care being taken to design the abutments of the arch and its thickness. A competent civil engineer conversant with the details of the location and loading could give a proper design and dimensions easily and quickly.

[By J. W. Howard, B. L., C. E., for MUNICIPAL ENGINEERING.]

ASPHALT PAVEMENTS, KINDS AND QUANTITIES.

How much Pitch Lake sheet asphalt, and how much of other kinds, and of brick pavement, are laid in the United States? In other words, is more Pitch Lake asphalt being laid than any other kinds of asphalt and brick put together? Does Sicilian rock last longer than Pitch Lake? Which costs the most? Which is the easiest repaired and replaced? Which looks best thereafter? You may think it strange that I ask these questions, but I have been trying to have New Haven lay some asphalt pavements. We have two or three miles of Sicilian rock pavement. Some people are dissatisfied with it. The present street committee have recommended Sicilian. I want them to lay some Pitch Lake. *B. C. F., New Haven, Conn.*

There exists in the United States about 1,500 miles of Trinidad Lake asphalt pavement laid by about thirty different paving companies and contractors. The asphaltum or mineral pitch is about 4 per cent. of the material used, including the foundation, or about 15 per cent. of the surface mixture. The gritty nature of the pavement is due to about 80 per cent. of sand in the mixture, the balance being powdered limestone or its equivalent. There are other lake asphalt pavements made on the same general formula, the asphaltum of which comes from various places in Venezuela, California, etc. Some of these pavements are excellent, others inferior, not always due, however, to the kind of asphalt used, but to errors in manufacture. The total amount of these other pavements is more than 400 miles. The asphaltic limestone pavements, known also as rock asphalt pavements, of which Sicilian is one, are composed of natural asphaltic limestone. No sand or grit is involved. The total amount of rock asphalt pavements of this class in Europe and America is a little more than 200 miles. The amount in America, including Canada, is about 35 miles.

Both pavements, when properly laid, are durable. The first cost of the lake asphalt pavement in America is generally less than that of the other class. The cost of maintenance and repairs over openings to pipes is less in the lake asphalt class of pavements, especially when the surface heating machines are used for general repairs. Both classes of pavements are standard, and are generally permitted to compete with one another. The specifications, however, must be carefully and fully prepared by reliable and experienced men, to secure good materials and workmanship.

The total miles of brick pavements reported to date, including all American cities, amounts to about 750. It is found principally in Western cities, including many small towns. A tabulated statement covering quantities, cost, kinds, etc., of asphalt, brick, granite, etc., is found on page 18 of the January, 1898, issue of this magazine.

LOW PRICES AND BAD WORK.

The prices bid for asphalt pavement in Newark, where I live, are lower than ever before. The work is done so rapidly that it does not seem as if we were getting as good pavements as those first laid in our city. They seem to be thinner and laid with less care and precision. How can good work be secured, when the paving companies are likely to lose money?
Tax-payer, Newark, N. J.

The city specifications, if conformed to, will probably secure good pavements. Printed copies can be had by any one by applying to the city engineer. The retention by the city of a part of the pay, and the bonded guarantee for at least five years, are additional securities. Nevertheless, close inspection by trained men is necessary. The inspectors are often political appointees who have no special training

for their positions. When a large amount of work is being done at one time, the city engineer can not give it his personal attention. Newark needs a consolidated, centralized, well-equipped engineering department, with additional permanent employes, independent of political parties. New Jersey cities, as those of several other States, need civil service in connection with their water-works, sewers, pavements and other public works, especially as far as the engineers and minor employes are concerned. The chiefs are generally retained, but many subordinates are not.

As to companies losing money, that is their affair, although it is not good policy for cities to award contracts at prices below cost, unless the city will compel good work and be ready to pursue bondsmen in case of default on contracts which so often follows when large amounts of work are taken at too low contracts.

LOW PRICES OF ASPHALT PAVEMENTS IN 1898.

Please let me know what you consider to be the principal causes of the great variations in the price per square yard of asphalt pavement during last year and the prevailing low prices this year. I am a member of a paving committee and do not know what price to recommend as a basis for estimates for asphalt paving which we desire. *X., Detroit, Mich.*

Inquiries made among the paving companies elicit several partial answers. The principal reason for the fluctuation in price was the desire to secure business, even at a slight loss, during 1897, rather than incur the greater loss which results from having large plants lying idle and paying certain men which must necessarily be constantly employed. Slight improvements in the methods of mixing and laying have reduced the cost a little, especially that of maintenance which, due to the surface-heating or repair machine, needs no longer add much to the first cost and be included in it. The "hard times" of the past few years have reduced the cost of labor and materials very much. When we remember that about 95 per cent. of materials entering into an asphalt pavement, including foundation, are crushed stone, cement, sand and powdered limestone, or its equivalent, we see that the cost of such a pavement is much reduced when the prices of these materials are reduced. The prices of asphalt and residuum oil or other flux do not so much govern the cost of the pavement as that of other materials and labor. The almost universally low prices of pavements of 1898 is due primarily to bitter competition and, as one company states, "to stay in the business temporarily until better times arrive, for many pavements are being laid at less than cost in many cities as a result of several companies bidding against one another at ruinous prices." A slight rise in cost must soon take place. It would be wise to use as a basis for your estimates, not the present cost, but an average cost in your city for as many years as possible. Cost is a local question.

GRANITE BLOCK PAVEMENT ON STEEP HILLS.

How can granite or other cut stone blocks be held in place on a paved street where the hill is very steep? Heavy showers wash out the blocks after a few months.
A. L. Dodd, Newburg, N. Y.

The blocks should be laid as closely together as possible. The crown of the street on very steep grades should be sufficient to force the water to the sides. Hydraulic cement mortar composed of one part of cement and two of sand or bituminous cement should be used to fill the joints between the blocks next to the curb and for a width of about

three feet along each side of the street. The water would thus be turned to the gutters and the rush there would not wash out the paving blocks. This is done throughout Europe, and in many cities in this country. Stone block pavements when thus laid, even without a concrete foundation, give lasting results on steep grades.

LIMITING PRICE OF PAVEMENTS.

We desire to have a first-class, durable, asphalt pavement in our city, but fear that if the specifications are drawn so as to secure such a pavement, advantage will be taken of the kind of asphalt we desire and an increase in price demanded. Would it be wise and legal to limit the price in some way? *Mayor of* ———, *N. J.*

In addition to having specifications which admit successful asphalts to competition, the price can be limited by inserting in the ordinance and specifications words to the effect that "any bids exceeding (here insert the maximum price the city is willing to pay) will be irregular and informal, and not be considered."

There is no legal or legitimate objection to this method of limiting the cost. The city engineer alone, or with the assistance of an expert, temporarily employed, could recommend the maximum price to be allowed. It would vary in different cities, because the price of materials, labor, freight, etc., are seldom the same. The above does not apply to asphalt alone, but to all pavements.

BY WAY OF COMMENT.

Uniform Cement Standards. Until quite recently the practice by various authorities in testing cement has been so varied that there was little uniformity in requirements. This was justified by the lack of definite knowledge of cements, particularly of American cements, by the local requirements, and by the better knowledge of the behavior of local cements or of favorite brands of imported cements. The vast improvements in the manufacture of American cements, and the increase in knowledge of their action has had a tendency to a uniformity of requirements, so far at least as Portland cements are concerned. The products of natural cement mills in various districts are not of sufficiently similar quality to make uniform specifications possible for them. Specific examples of this tendency toward uniformity of requirements, in specifications for Portland cement, are numerous. Thus in 1896 there were about as many varieties of specifications in use in the United States Engineering Department as there were officers in charge of work, and variations in quality were considerable. Tensile strength of neat cement required after one day in air varied from 70 to 300 pounds, after six more days in water, from 300 to 500 pounds, after a month, from 400 to 700 pounds, and so on. The mere compilation of the table showing differences has produced greater uniformity, and the personal differences are now disappearing, leaving only those demanded by the difference in character of the work.

Similar approach toward uniformity is noted in other classes of work. Much of this is doubtless due to the efforts of manufacturers and their agents, as practical uniformity for similar circumstances is essential to the economical production of material, and to satisfactory results therefrom. Mr. R. W. Lesley has collected the statements of many specifications in a paper giving "A Summary of Recent Cement Specifications." The tendency toward uniformity is shown in the averages for various classes of work. Thus the averages of the United States government specifications, of European government specifications and of 91 other miscellaneous American specifications show variations from 134 to 144 pounds after one day, 347 to 394 after seven days, and 528 to 536 pounds after twenty-eight days, a most remarkable agreement. When the results are divided into smaller classes, however, the concordance is not so pronounced, but the differences are susceptible of explanation. Thus in the table giving averages of United States engineers, nine cities, six railways, six bridges, three aqueducts, the lowest requirement for fineness is made by the railways, followed in order by the aqueducts, the United States engineers, the bridges and the cities. For tensile strength of mortar the order is very nearly the same, also for tensile strength of neat cement, excepting that the United States engineers here take the place at the end of the list, by requiring the highest figure. The average character of the work in each of these divisions may reasonably be considered responsible for the order in which they occur in the list. Most city work is less massive than that in the other classes given, and a material increase in requirements might reasonably be expected here. Only in such work as concrete arches or walls where appearance and durability under severe conditions are required would demand higher standards.

Cities show a tendency to increase their requirements more rapidly, perhaps, than other classes. Thus Philadelphia now requires a material increase in tensile strength over the specification in use in 1896. From 450 to 500 pounds tensile strength per square inch neat, after seven days from 550 to 600 neat, after twenty-eight days, with proportionate increase in strength of mortar. One marked tendency of city specifications is towards a high requirement after one day, the average being 161 pounds, while the United States government engineers require 131 pounds, and the railways but 115 pounds. This probably arises from the fact that city work is so frequently hurried in its time of completion and use, and must therefore attain its strength at the earliest possible moment. This tendency towards rapid increase in strength may be so great as to lead to the adulteration of cement by materials which will produce this high early strength at the expense of later development

in strength, and even produce diminution in strength, and disintegration of the mortar in the structure.

Even the averages in the case of natural cement show great variations in requirements. Individual specifications, which are intelligently prepared, show to the well informed engineer, by their requirements, the character of the local hydraulic cement.

Baltimore Sewerage. The city of Baltimore has attained a population of more than a half million, and is still without a sewerage system. A large number of drains for carrying off surface-water have been designed and constructed with varying degrees of skill, which, with a few exceptions, are adequate for this purpose. Some house drainage is provided for by private drains, and much of the central portion of the city is drained into the surface-water sewers, although permission for such connections has always been given under protest, expressed or implied. The city and county drain their public buildings also in this surreptitious way. Most of the house sewage must, however, be removed by wagon. The methods of removal are far from satisfactory though, at least theoretically, under control of the board of health.

It seems hardly possible that a large and wealthy city in this country and age could be in the condition of Baltimore. Not only is this true, however, but there is no immediate prospect of improvement, whether from dread of the expense or from an almost inconceivable condition of lethargy. All sorts of temporary and impractical schemes are proposed to postpone the evil day when the work must be actually begun. The city is at the head of the Patapsco river, ten or twelve miles from Chesapeake bay, the tide rises but a few inches, and there is a little fresh water running into the river, all the streams being polluted also by sewage from the city. Consequently the refuse deposited in the basin or harbor settles or floats on the surface, remaining until decomposition produces nuisances which are unbearable to visitors and are becoming so to the population immediately surrounding. Dredging is proposed, with no thought of the endless repetition of the operation which will be necessary. A harbor commissioner soberly proposes to sprinkle the harbor with lime in sufficient quantities and with sufficient frequency to disinfect the water! A tunnel to add a supply of fresh water is proposed by the mayor, with no hint as to whether the amount available is sufficient to produce any effect. He proposes also to send the sewerage commissioner to Europe to find out the best thing there and bring it home.

All this seems very much out of place in a city of this size. We have come to expect every city official in a small city to become a full-fledged municipal engineer by virtue of his election or appointment

to any official position, but the problems in a large city are so overwhelming to the layman and the average understanding of this fact is so complete among those influential in affairs in large cities that the Baltimore methods cause surprise. This surprise is increased when it is known that the city has already had three reports by sewerage commissions which have been remarkably concordant in their recommendations when the differences in time are considered. The first commission was appointed in 1859 and reported in 1862. The second commission consisted of a single engineer, Mr. C. H. Latrobe, appointed in 1881.

The third commission, with a past president of the American Society at its head, Mendes Cohen, was appointed in 1893, and made its report last year, having the constant assistance of Kenneth Allen as principal assistant engineer, and the assistance and advice (in which both concur), of Messrs. S. M. Gray and Rudolph Hering, and the further advantage of consultation with Col. Wm. P. Craighill, of the United States corps of engineers, who is fully conversant with all the local conditions affecting the discharge and disposition of sewage. Their elaborate report of 232 pages, with many maps and drawings, covers the ground completely and their recommedations are strongly put and well fortified by argument and array of facts.

The only difficulty seems to be that an adequate system of sewers to dispose of the entire house sewage of the city will cost somewhat more than $10,000,000, with an annual expense for maintenance of a little more than one-third of a million. The expense for construction would necessarily be spread over ten years or more, and the cost of maintenance would increase from zero as the construction proceeded and connections were made. This seems like a small figure for the sewerage of so large a city but the conservative tax-payer sees it all at once, and will not distribute it through the coming years as the requirements of actual construction demand. Neither does he see the long years of saving when the expense of carting away his most offensive refuse is cut off by the new method of water carriage. There is no doubt it will cost more money to construct the sewers now than if they had been properly constructed at the proper time, and also no doubt that he has lost money in the past on account of excessive annual expenditures for removal of sewage, but the future saving will soon repay the extra present expenditure. Longer waiting will only increase the cost of construction and add to the sum needlessly spent each year on wasteful methods of removal. Smaller cities can see here the great disadvantages of undue postponement of this class of improvements.

Errors in Bids. The question of the rights of bidders on public work in case errors have been made in making bids or filling

blanks has received considerable light from the decision of the case of Moffett, Hodgkins & Clarke Company against the City of Rochester, in the United States circuit court for the northern district of New York. When the bids were opened and during the reading the representative of the company announced the fact that two errors had been made in writing out the bid and claimed the right to withdraw his bid. The refusal of the city to recognize this right led to the suit. The company was able to prove that the errors claimed were actually made and to show that they made a difference of about $64,000 in the cost of the work. The court decided, after a lengthy argument, that the careless bidder had a right to withdraw his bid.

The question now arising is, where shall the line between clerical error and error in judgment be drawn. Also, it would be easy for a low bidder by collusion with one or more other bidders to practice a fraud on the city and thus frequently secure the work for one of the members of the combination at a higher figure than the lowest bid, by timely claims of error. If the board of works assumes the decision of the question whether an error has been made, there is, again, chance for favoritism, and at least insufficient authority to procure information upon the subject. Therefore, notwithstanding the establishment of the principle on which the decision should be based, it will be safest for the board to leave the decision of the questions of fact and of the principle involved in the particular case to the courts, denying the right to withdraw the bid until the court has decided it to be erroneous.

Asphalt and Street Rails. The conclusions drawn from very general observation by several experts seem to be that with the usual methods of laying street railway tracks, without special foundation under the ties, the repair of the asphalt next the rail is excessive if the rail is but six inches, or less, in depth. If it is eight inches or more in depth, the amount of vibration is so much reduced that the repair along the rails is reduced to a reasonable figure. If a concrete foundation is placed under the ties, there is scarcely more repair along the rail than along any other boundary line between asphalt and other material. The unsightly brick or stone toothing is also found to be unsatisfactory. When poor foundations or light rails require brick or stone along the rails to take the vibration, straight lines between asphalt and brick or stone give much better satisfaction. Some of the new repairs in Detroit are excellent illustrations of these facts.

Better Technical Education. Under the title "A Higher Industrial and Commercial Education," Professor Johnson, in his presidential address before the Society for the Promotion of Engineering Education, makes a

plea for schools similar to the German mono-technic schools, which are trade schools, and more because they have a basis in the fundamental studies which all engineering courses should have, and then put about three years into the special training for the trade or branch of the engineering profession which is chosen by the student. He attributes the rapid advance of the German nation in manufactures and in commerce to these technical or trade schools, and to the schools of commerce which do a similar service for students choosing commercial pursuits for their life work. He also describes, without distinguishing them from mono-technic schools, what are actually trade schools, not requiring the same basis of education.

Professor Johnson says we have no such schools, and that we must have them if we wish to retain our prestige in manufacturing and gain any in commerce.

The two kinds of schools (which shade into each other by almost imperceptible gradations) have quite different purposes and produce quite different results upon the students. The trade schools, requiring for entrance little more than the most rudimentary education, produce better artisans and men who, if endowed with natural ability may be made foremen or superintendents of divisions of manufactories, when experience is added to their school training. Such schools, properly planned, are a material improvement upon the apprentice system in every respect but one, that of experience, and they put the artisan into such condition of training that he can improve his standing more rapidly in this regard, and with better appreciation of the reasons for the facts which he observes.

The mono-technic schools do much more than this. In their highest and best form they demand a fair approach to a liberal education as a condition of entrance, a standard equal to that attained at the end of two years in an American technical school. With this basis they are able to give their students in their course of three years a training in all the details of this chosen branch of trade or manufacture, and at the same time to give them the scientific basis for the processes involved, and show the development of the art or science involved and the probable lines of future improvement. Graduates of such schools are able, after a reasonable amount of practical experience, to take charge of manufacturing or trade enterprises, to manage them successfully and to advance the knowledge of principles and processes.

The technical instruction in the two kinds of schools is not far different in ground covered, or even in methods of instruction in many branches, but the difference in preparation of students and their difference in capacity, in the average, produces great differences in results.

Professor Johnson does not develop this difference with sufficient care, and one who reads his paper is liable to say that he considers this technical instruction responsible for the great advance in the ability of Germans to manage enterprises requiring technical skill and the consequent marvelous progress of the nations in trade and manufactures. He would probably reply that this ability is the result of the excellent training of the powers of the mind which is obtained first in the preparatory course of study for the mono-technical school, followed by that in the school itself, and that the application to the specific branch of manufacture was due to the specific instruction in a particular school, and that the instruction in the trade school made better artisans but did not necessarily produce capable superintendents and managers.

We agree with Professor Johnson that these classes of schools are of great value to the nation. We need both kinds. We are making some progress in trade schools, but thus far have made little progress in the higher grade described. The warning which must be heeded by Americans in establishing schools similar to the mono-technic schools, is that a formation must be laid in a good general education with scientific tendencies. The place for the higher grade school desired is not at the natural break in our system, after the high school course, but is after two or three years of college or engineering school training. The tendency in this country will be towards dropping out these two or three years, which are required in the German schools. The results of such action would be to diminish the power of the graduate by this amount, and to handicap him in the race with those having the better equipment, causing him to take lower positions until by several years of study and experience under somewhat adverse circumstances he can recover the lost ground; or if this competition is lacking, he will find his product must meet the products of other better prepared establishments and he must stand the loss of trade and lowering of price until he can gain the lacking power through the education given by experience, observation, and individual experiment.

The same reasoning applies to the proposed schools of commerce. We need schools that will teach commercial methods, geography, and law, the history of commerce, the details of commercial products, languages, the technical details required in many lines of trade. If, however, the ordinary school-boy is put into this course of study of two or three years, he will become a good clerk in such business, but, except by unusual natural ability, or through lack of trained competitors, he will not attain to positions of management or control. A strong preliminary training, like that demanded for the mono-technic

school, will give him a great advantage in the race of supremacy.

Municipal Ownership. The earnestly interested municipal officials who attended the recent meeting of the League of American Municipalities in Detroit showed more spirit in discussing municipal ownership than any other question affecting cities. One of the planks in the platform of the league has been municipal ownership of public utilities, and its first president was most outspoken in his advocacy of the principle. Without inquiring as to the ulterior motive for pushing the question to the front in this organization, a valuable service has been done by this action. Some valuable points were emphasized at the recent meeting in Detroit.

The independence in theory of this question and that of good municipal government was recognized, but the necessity of a merit system to secure results in management and operation comparable with those secured by private corporations is not less obvious.

There was no serious discussion of the fundamental principles upon which the theory of municipal ownership rests, nor of the logical steps to be taken in this direction. Neither was there much discussion of the principles upon which good city government is based, nor of the modifications of American practice which are necessary to give our cities what they need, but do not yet demand. While these two lines of discussion are independent, they are parallel, and satisfactory results in all respects from municipal ownership can not be attained unless material improvements are made in municipal methods of management so far as these departments are concerned.

As developed in a short leading article in the January number, and in several articles in this department from time to time, there is a pronounced tendency towards municipal ownership, beginning with the construction of sewers and continuing through the construction and repair of streets, the supply of water and electric light, with a few instances of supply of gas and heat, ownership and management of street railroads, telephones, telegraph and others. The underlying principle seems to be that such public utilities as are natural monopolies should ultimately be owned by the municipality. The rapidity with which this ownership shall be assumed, and the order in which the various monopolies shall be absorbed by the city seem to be fixed by the rate of progress in the cause of good government, and by the universality of the need of them. Thus there is now little question of the municipal control of the construction and repair of streets in cities large enough to demand any sort of pavements, nor is there objection in many places to the absolute municipal control of sewers. The supply of water is rapidly taking its place on this side

of the line, as the difficulties of procuring and protecting supplies by private corporations increase.

Similarly municipal lighting is frequently undertaken, but the furnishing of light to private consumers is not fully recognized as a true natural monopoly. The operation of street-car lines, telephones and other similar monopolies, is still further removed from general municipal necessities, as they serve more directly the individual citizen. Good government must take some large strides forward before municipal ownership of the latter class will have much vogue.

Glasgow is going so far that she is losing sight of the principle on which municipal ownership is based in most minds, and is taking charge of amusements, dwelling houses for working men and other charities; and fields where there is no hint of monopoly, natural or artificial. The time for reaction and return has arrived there.

A Very Bad Example.

People are often judged by their associations. If this rule is applied to the municipal officials responsible for membership in the organization which calls itself the League of American Municipalities, the position in which they now find themselves must be very distasteful. In no municipality would the people knowingly tolerate in their local officials the questionable abuses and irregularities which have become chargeable to this League during its existence of less than a year. If responsibility for its character and record should be admitted by them it would be equivalent to confessing that they are willing to countenance official irregularities in financial matters. If this confession should be made directly to the people who put them in charge of municipal affairs it would certainly result in loss of confidence in them by their constituents and loss of position. The public is confronted with the astounding fact, however, that an organization assuming to represent American municipalities is discredited by having made for itself a record of this kind.

There is nothing to be said but that the organization is irresponsible or is destitute of due regard for common standards of propriety. Municipalities having no sympathy with this sort of thing may regard it as an insult to be asked to join in and become parties to its schemes and its conduct. It is due to most of those who have been drawn into connection with it to say that the unfortunate record of the League has been made for it by only twenty-seven out of seventy-two municipalities which were induced during the year to join it, and there is good foundation for the belief that the municipalities which have had no responsible part in the discreditable conduct of the League, except their nominal connection with it, will clear themselves when the time comes for them to be heard from. An organization that assumes to represent American municipalities should be itself a good example of

proper conduct of affairs, and should be managed by men of high character, with reputation for ability, thorough experience and knowledge in connection with municipal government.

It is understood that the newly elected president of the League of American Municipalities, Mayor Black, of Columbus, Ohio, is deeply chagrined over the embarrassments of the organization, and that he hopes to be able to relieve it from its predicament. Certainly the sooner the task is accomplished the better it will be for the organization.

City Officials' Societies.

Engineering News has a long editorial in a recent number regarding the organization of so many national societies concerned with municipal affairs, and very properly questioning the duplication of effort which occurs. There are two great divisions to which such societies can be assigned. One has to do with the questions of municipal government. There are numerous good government clubs, and municipal reform associations, with the National Municipal League as a central organization, whose purpose is conference upon methods, and education of tax-payers and officials. The other has to do with the problems of public works of all kinds. Two or three kinds of societies belong to this class. The engineering societies in a part of their work may be counted in. The water-works associations, whether national or sectional, form a group.

Such an association as the English Association of Municipal Engineers and Surveyors would be another legitimate member of the class. The Public Health Associations have some connection. Then there are the associations of municipal officials who are engaged in public works. These associations, if successful, must have as their main dependence the work of the experts in the various lines of municipal work, the engineers, sanitary, bridge, electrical, mechanical, the health officers, and other technical men, with the assistance of all municipal officials who have influence in the constructive or sanitary departments. The American Society of Municipal Improvements is a society established upon this basis and it has now had several years of successful experience and has done much valuable work. The great value of such a society is the interchange of experience and the spread of knowledge. This value depends directly upon the technical ability and practical experience of the members imparting their knowledge; hence the necessity of the presence of men of high standing in the constructive professions among the members. This is a notable characteristic of the society mentioned.

Our contemporary questions the desirability of beginning or continuing the existence of the League of American Municipalities, on the ground that all its objects are better attained in societies already

formed. A careful study of the proceedings of the recent convention at Detroit and a reading of the papers show that the league does not seriously attack any question of municipal affairs, unless, possibly, that of municipal ownership of public utilities, and this is considered more in the manner of the politician making points for a campaign than with any serious scientific study of the details of the question. Our contemporary feels that the league is a rival of the American Society of Municipal Improvements, and that it is perhaps intentionally so. We can not see that this is true in any but the most superficial sense. Few serious students of municipal problems are long satisfied with the inadequate treatment of subjects by the league, and when the more thorough methods of the A. S. M. I. are recogized are ready to transfer their membership. Those who become members for any less laudable purpose are not desirable members for any society, and if largely predominant in it, will soon lead it to its destruction.

The flavor of personal interest in the League is too strong to make the organization acceptable to thinking men. The methods of the two societies need but slight inspection to determine which is the more valuable, and to show the slight grounds there are for a statement that they are rivals in any true sense.

LEGAL DECISIONS.

[Reported specially for MUNICIPAL ENGINEERING.]

Steam Rollers Not a Street Obstruction—A steam roller, while being properly used in repairing a street, is not such an obstruction or defect in the street as will render the city liable for injuries inflicted by a horse frightened by such machine. Lane vs. City of Lewiston (Me.), 39 Atlantic Rep. 999.

Electric Light Plant Not Public Necessity—Under the laws of North Carolina prohibiting municipalities from contracting debts or laying taxes, except for necessary expenses, unless by a majority vote of the qualified voters, such city having general powers only, cannot issue bonds for the erection of an electric light plant for lighting its streets, as such plant is not a "necessary expense," without legislative authority to submit the proposition to the voters and a ratification by a majority of such voters. Mayo vs. Town of Washington (N. C.), 29 Southeastern Rep. 343.

Defective Issue of Bonds Not Cured by Recitals—Where water works bonds are issued by a city in excess of the statutory limit, and without giving the notice of an election authorizing the same for the length of time required by the statute, such defects are not cured by recitals on the bonds, nor by a certificate of the state auditors that they have been regularly and legally issued. Springfield Safe Deposit & T. Co. vs. City of Attica, 85 Federal Rep.

Enjoining City From Carrying On Business—While a person carrying on a similar business cannot on the ground that the same has been injured or destroyed by competition on the part of the city, enjoin it from engaging in a business which is ultra vires beyond its charter power, he may do so as a citizen and tax-payer. Keen vs. Mayor, etc. (Ga.), 29 Southeastern Rep. 42.

Manufacture of Gas By City—Supplying public places and private citizens with gas for lighting purposes is not strictly a municipal function, but its power in this respect (in Pennsylvania) is conferred on the city as corporation, and need be exercised at its option only. Bailey vs. City of Phil. (Pa.), 39 Atlantic Rep. 529.

Liability of City for Stopping Street Im-

provements—When a city accepts work on a street under a contract, and by its own action discontinues further work thereunder, it is liable for the breach, although it has thus disabled itself from collecting assessments on the property benefited to pay for the work. City of Dunkirk vs. Wallace (Ind.), 49 Northeastern Rep. 463.

When Objections to Improvements Are Too Late—After street improvements are completed a land-owner cannot object to assessments for same on the ground that the contract was let to one whose bid was slightly more than that of another, although the law requires the contract to be let to the "best bidder." City of Bloomington vs. Phelps (Ind.), 49 Northeastern Rep. 581.

Contractor Bound By Certificate—Under a contract providing for compensation at a fixed price per square yard of earth moved, the amount due to be certified by the general manager of the railroad month by month, such certificate is conclusive, in the absence of fraud, mistake or gross carelessness, so as to prevent the contractor after completing the work from asserting a claim for extra compensation or alleged overhauls. Breyman vs. Ann Arbor R. Co. (U. S. Cir. Ct.), 85 Federal Rep. 579.

Streets, Grades and Railroads—Where a street railway company, for its own pecuniary advantage, lays its tracks on streets whose grade has been established by ordinance, but which the city is not prepared to grade, and perhaps will never have occasion to construct, the railway company is liable for damages occasioned by such work to abutting property. Bancroft vs. City of San Diego (Cal.), 52 Pacific Rep. 712.

Parties Bound By Estimate of Engineer—Where parties agree that payments for work and materials shall be made upon estimates of a certain engineer, to recover more a party must allege and prove fraud or mistake on the part of such engineer in making estimates. Thompson vs. Bradbury (Idaho), 51 Pacific Rep. 758.

Paving Contracts In Iowa—A city has no right to make a paving contract where it failed to publish notice as required by the laws of the state showing the "extent of the work, * * * when the work shall be done, and at what time the proposals shall be acted upon." Polk vs. McCartney (Iowa), 73 N. W. 1067.

No Damages Where City Completes Different Sewer—A city cannot recover damages for failure to complete a tunnel in accordance with contract which provides that, in case of default on the part of contractors, the city should complete the work at their expense, when the tunnel as constructed by the city is essentially different in plan and construction and cost from that for which it had contracted. Milwaukee vs. Shailer (U. S. Cir. Ct. App.), 84 Federal Rep. 106.

CURRENT INFORMATION.

Irregularities in the League of American Municipalities.

The League of American Municipalities, the organization which was started a year ago under circumstances which brought it under suspicion as a movement which the promoters were manipulating for private gain, put itself before the public at its Detroit meeting in a still more questionable attitude. Not only did it fail to correct abuses in the management, but it discredited itself and showed a degree of irresponsibility which could hardly be expected from any body of intelligent men.

The League assumes to represent American municipalities or such of them as have been drawn into connection with the organization. If the management of its affairs is a fair representation of the method and character of administration in the municipalities belonging to the League the unfortunate tax-payers who may be subject to such rule are much to be pitied, but, if this were true, the evil would not assume the proportions of a national calamity, for the total number of cities and towns represented at the meeting by membership in the organization was fifty-two. About twenty others reported as having joined the League were not represented. As a matter of fact the membership is a doubtful quantity. There was no roll-call until it was demanded on the third day of the meeting, no committee on credentials was appointed at any time, and there was no verification of membership in any of the ways usually followed by deliberative bodies. A little loose procedure of this kind, however, was of small moment in comparison with other irregularities. The secretary, B. F. Gilkison of New York, admitted in his report, that, since the first week in January, he had not turned over to the treasurer money collected by him. No receipts or vouchers showing where the money had gone were submitted. The treasurer, Samuel L. Black, submitted his report

in good business form, showing that he had received $590, how it had been disbursed, with vouchers therefor, together with his bank account as treasurer. He refused to assume any responsibility in connection with the money that had never been turned over to him by the secretary, but, accompanying his report, submitted a letter from Gilkison offering to give him a check for $750 if he in turn would hand Gilkison a check for the same amount at the same time for salary. He had declined to be a party to this proposed transaction. The treasurer also submitted as exhibits bills and letters from creditors of the League in New York complaining because they were unable to collect the money due them. The two reports showed that while $2,280 had been collected from cities belonging to the League, the secretary had not turned over to the treasurer any of the funds after the first three months; that out of the $2,280 there was only $3.55 left on hand, and that there were bills that had not been paid. The provisions in the constitution for the handling of the funds had been almost wholly ignored. The treasurer had called the attention of the president, John MacVicar of Des Moines, to the irregularities of the secretary, but his efforts to obtain a proper accounting had been in vain. Why the president failed to require a proper handling of the funds, when it was his duty to do so, as well as to approve all bills before money could be disbursed, were matters that he did not see fit to explain to the League.

On motion of Mayor Gibson of Zanesville, O., an auditing committee was appointed. This committee consisted of Mayor Gibson, Mayor Johnson of Fargo, N. D., and F. A. Walker of Trenton, N. J. The committee had been assured that it would find everything all right, but when it called for vouchers and receipts as evidence of the secretary's expenditures, they were not forthcoming. The committee reported that it could not excuse this as a technical error, as claimed by the secretary, and that the secretary's conduct should not be passed lightly. The secretary's friends attempted to defend him by claiming that in working up the movement a year ago he had advanced money for expenses and had reimbursed himself in this way. It was shown, however, that this was not in accordance with the facts, for during the first three months money had been turned over to the treasurer in accordance with the requirements, and it was since the first of the year that the secretary had failed to turn over the money that came into his hands. In the face of the disclosures the League was compelled to adopt the report of the auditing committee censuring the secretary, but, after doing this, how it could excuse its action in subsequently re-electing as secretary the man who had been guilty of these irregularities is inexplicable. This, however, was what was done by the League of American Municipalities. As an example to American cities of business management and straightforward methods it is not calculated to inspire confidence. It is a very substantial kind of encouragement of irregularities in financial methods. After the disclosures Gilkison announced that he would not be a candidate for re-election, and it was proposed that John MacVicar, the president, should be nominated for the office. MacVican expressed his willingness to accept the position, stating that he had sold out his business and would be able to give time to the League. There was criticism of him on account of his willingness to step from the presidency to the secretaryship, and because he as president had permitted the irregularities of the secretary to continue after the treasurer had called attention to the matter. MacVicar's name was not presented to the convention, however, when the election occurred. An appeal to sympathy was made in Gilkison's behalf, and he received 27 of the 41 votes cast.

There appeared to be little earnest interest in the meeting by the majority of those in attendance. The attention of the delegates was given chiefly to the entertainment features provided for their pleasure by the city of Detroit, and it was evident that most of those who were there went for this enjoyment. It was evidently not expected that there would be much serious interest in the meetings. The program was remarkable for its failures. It provided for general discussions to be led by certain persons, most of whom failed to appear, or send substitutes or excuses. Interesting contributions were made by two or three college professors who were not on the program, an able address was delivered by Mayor Jones of Toledo on municipal ownership, and from a few good speakers and earnestly interested delegates who had gone to the meeting hoping to learn something, the convention derived whatever of serious character was shown in its proceedings. An outline of this phase of the meeting is given below.

In his address at the opening session President MacVicar urged more serious consideration of the problems of municipal life, and favored municipal ownership of public utilities and the merit system in municipal service. With these two reforms

he thought "there would be less to prevent the peaceful evolution of good government in municipalities."

Governor Pingree, in an address, expressed the opinion that the vital question in municipal reform is how to compel so-called good citizens to take an active part in city affairs in some other capacity than fault-finders. He believed in getting knowledge from other cities, and told how he had taken the officials of Detroit on a junket at a cost of $5,000 for the purpose of learning from other cities.

In a paper on "Garbage Disposal" F. A. Walker of Trenton, N. J., referred to the systems of destruction and reduction, and favored the former, which is in use in Trenton. The garbage is collected at an expense of $6,000 per year and is destroyed in a Dixon crematory which has been in use over two years with little cost for repairs. It is operated at an expense of 30 cents per ton for the material cremated.

C. A. Collier, mayor of Atlanta, said that the same system was operated in his city and the expense of the sanitary department is $140,000 per year. Mayor Maybury spoke of Detroit's contract at $50,000 a year for three years for collecting garbage and carrying it on cars to a reduction plant 20 miles from the city. He favored collection of garbage by the city instead of having the work done under contract.

James A. Lavery, president of the Labor Federation of New York, spoke on "The Relation of Municipalities to Organized Labor."

In a discussion on administration by boards, single-headed commissions or council committees, Mayor Young of Akron, O., favored placing one man at the head of each department, and Mayor Evans of Birmingham, Ala., thought that council committees should have charge.

Prof. Frank Parsons delivered an address on "Municipal Liberty, or Local Self-Government." The scheme of government which he advocated included municipal ownership of public utilities, the initiative and referendum and woman suffrage.

In the discussion on the regulation of saloons there was strong opposition to severe restrictive laws affecting saloons. It was urged that efforts to raise the standard of the saloon business, instead of degrade it, would have good results.

An interesting address on municipal ownership of electric lighting plants was delivered by Prof. Bemis of Kansas University.

Mayor McGuire of Syracuse delivered an address on "Municipal Water Works." He described the excellent system in Syracuse and spoke of the advantages derived by the people of his city from municipal ownership. The average rate for families is about $5 a year and it is expected that this will be reduced to $4 in about three years. The city appropriation for the water department is $50,000 a year. The experience in the water department of Syracuse had been favorable to the day labor system for public work. George Hillyer, president of the water board of Atlanta, described the Atlanta water works. He advocated the use of reservoirs of 20 to 40 days' capacity and favored the use of meters. This system had enabled the Atlanta works to largely reduce their fuel expenses and pumpage. He favored also mechanical filtration.

The discussion on municipal ownership, on the fourth day of the session, was the most spirited of the meeting. It was led by Mayor Jones of Toledo, who favored municipal ownership. Mr. Greene, who spoke as a former mayor of Binghampton, N. Y., thought that information should be sought on both sides of the question and favored writing corporations to send representatives to join in the discussion. He offered a resolution requiring a uniform system of accounting for municipal electric light plants to be erected by the state which was adopted.

The election of officers resulted as follows: President, Samuel L. Black, mayor of Columbus, O.; vice-president, W. C. Maybury, mayor of Detroit; treasurer, T. P. Taylor, mayor of Bridgeport, Conn.; secretary, B. F. Gilkison, New York City. Mayor Taggart, of Indianapolis, over his protest, was unanimously elected treasurer. After his positive declination, Mr. Taylor was elected. It was decided to hold the next meeting at Syracuse, N. Y.

The entertainment provided by the city of Detroit included a reception by the mayor, an excursion by boat to St. Clair Flats, a band concert and illumination at Belle Isle Park and a trip to Water Works Park.

Arrangements had been made for exhibits by manufacturers, but there were few, including the Welsbach Light company, the Atlas Cement company, the Dixon Garbage Crematory company, the United States Voting Machine company and Seagrave & Co.

An injunction against the expenditure of public funds in providing the entertainment was obtained from the courts by citizens of Detroit, but this did not affect the entertainment, as the arrangements had been made and the bills incurred before the injunction was issued. It was held that the money which it was proposed to use be-

longed to a fund that could not be diverted for entertainment purposes.

A Consul's Report on Pavements in Berlin.

The State Department at Washington is in receipt of a report from Consul-General Goldschmidt of Berlin, in which he gives facts regarding the pavements in Berlin. The area of carriage pavements is 6,500,405 square yards. Of this area a fraction less than 74 per cent. has stone pavement, about 25 per cent. asphalt, and a fraction over 1 per cent wood pavement. The proportion of asphalt is steadily increasing. The soil, continues Mr. Goldschmidt, consists of coarse, gritty sand, forming apparently an excellent foundation for the heavy 8-inch layer of gravel and cement, over which the 2-inch covering of asphalt is spread, making a strong and durable pavement. The average price of asphalt pavement in Berlin is $2.80 per square yard. The city government grants the contracts for laying the pavements, and also for keeping them in repair for twenty years, the first five years without extra compensation, and after that for an annual compensation of 10 cents per yard.

A Municipality Enjoined from Constructing Water Works.

The Supreme Court, in Philadelphia, handed down a decision recently which is of much importance to boroughs building water works. After the decision in the case of Metzger against the borough of Beaver Falls, Pa., in which the borough was enjoined from constructing its own works because it had exhausted its municipal power to build works by an existing contract with the Union Water company, the People's Water company was formed by citizens to give the borough a supply. The council passed an ordinance for a contract for ten years, from January, 1898, at $4,000 annually. Under the contract the borough was given the right to purchase the plant at any time after its completion. In behalf of the old contract with the Union Water company Titus M. Welsh asked the courts to stop this move. The lower courts enjoined councils from adopting that part of the contract providing for the purchase of the plant, but declined to interfere otherwise. Justice Dean of the Supreme Court finds that the proposed contract is a palpable attempt to evade the decree of the Supreme Court in the Metzger case, and while it refrains from giving an opinion as to the borough's right to allow a second company to lay pipes in alleys and streets, it holds that the borough must not indirectly and evasively do that which by a former decree it was prohibited from doing directly; that the borough has exhausted its right to contract with water companies for municipal purposes when it made the contract with the Union Water company. The decree of the lower court is reversed, and it is ordered that an injunction issue preventing the borough council from passing the ordinance and from entering into any contract with the People's company for supply of water for municipal or fire or other purposes.

Annual Meeting of the American Society of Municipal Improvement.

The fifth annual convention of the American Society of Municipal Improvements will be held at Washington, D. C., Oct. 26, 27 and 28, the time having been advanced two weeks for the convenience of many members who wish to attend the conclave of the Knights Templar to be held in Pittsburg during the week corresponding to the regular date. President Van Duyne accordingly took the responsibility of changing the time on the unanimous request of the executive committee. The president has also sent letters to the chairmen of the several standing committees urging them to make the coming meeting the most instructive and helpful to members of the society that has yet been held. He has suggested that in preparing reports the important conclusions reached by committees should be sent to different members of the society interested in the subject, with the request that they each prepare a paper requiring not over fifteen minutes in reading discussing the particular point or conclusion reached. It is expected that this plan will result in having more members take part in the discussions, and the experiences of many cities will be more clearly brought before the convention. The letters received by President Van Duyne from chairmen of committees indicate that the work of preparation for the convention is progressing well and that "the Washington meeting," as he says, "will be a very instructive one to all."

The American Society of Municipal Improvements is composed of officials—mayors, councilmen, boards of public works, city engineers, commissioners and superintendents—representing the leading cities throughout the country. The fee for membership is nominal, being only $5 for each municipality, which entitles it to as many representatives as it may wish to send to the meeting. It has no high-salaried officers. It dis-

cusses the practical questions affecting municipalities and much valuable information has been brought out at its meetings.

Decision on the Method of Assessments for Improvements.

In an opinion submitted by Judge Archibald Aug. 15 the assessment for the Mulberry-st. paving in Scranton, Pa., is declared invalid, and a total change in the cost to each of the property-owners who were called upon to pay for it becomes necessary. When the assessment was prepared by City Engineer Phillips, he was guided by the foot-front rule, by which procedure the expense to each one was determined by figuring the whole cost of the pavement, including street intersections, and dividing it by the total frontage of the properties abutting on both sides of the street. The court decided that if this were followed to its logical conclusion, properties on the portion of a street wholly occupied by street railway tracks might be made to pay as much as those where the street was entirely clear of them.

The Company Could Not Be Compelled to Furnish Water.

In the mandamus suit of W. H. Stackhouse vs. the Pocatello Water Works company, at Pocatello, Idaho, Judge Standrod decided in favor of the water company Aug. 8. The grounds on which the suit was instituted were that the water company shut off the plaintiff's water on the ground that he had violated certain regulations of the company in regard to sprinkling and irrigation. The plaintiff demanded of the company that the water be turned on again. The plaintiff refused, however, the payment of 50 cents as the cost of turning off the water, and a promise to observe the rules of the company in the future. He asked the district court for a mandamus directing the company to turn on the water or show cause why they did not do so. The court holds that the facts set out in the answer, that of violating the rules and refusing to comply with certain other rules, furnished sufficient cause for the water company's action.

Legal Opening of Bids.

Justice Pryor of the New York Supreme court, in a decision rendered recently, held that when bids are advertised for by the city, they must be opened by the officer authorized by the statute, or, if opened by a subordinate, that such opening must be public and in the presence of the officer who advertised for the bid. The decision was rendered in an application for a peremptory writ of mandamus made by Wm. J. Rodgers to compel Controller Coler and Commissioner of Highways Keating to accept his sureties on a contract for improving Woodlawn road. Louis N. Haffen, the commissioner of street openings and improvements, was attending a meeting at the mayor's office the day the bids were opened, which was Dec. 31, 1897, and the bids were opened by his secretary. The new charter came into existence the next day, and Contractor Rodgers, who was the lowest bidder, requested the controller and Commissioner Keating to examine his sureties for the due performance of his contract. They refused to do so on the ground that he was not legally the contractor, as his bids had not been opened by Commissioner Haffen and had not been opened publicly. Judge Pryor said that it is to be assumed that in requiring bids to be opened publicly by the responsible officer, instead of privately by an irresponsible subordinate, the legislature introduced a security for the public interest, by providing against the possibility of fraud and imposition. The only safeguard of the public trust is to hold officials strictly within the limits of their defined powers and to compel an exact performance of their prescribed duties. If the physical act of opening the bids may be done by a deputy, it must still be done publicly, and in the presence of the commissioner, and he had no authority to accept that of the relator.

Suburban Extension.

Some interesting information regarding suburban extension was contained in some statistics which appeared recently in the North American Review, which are, in part, as follows:

"Chicago used to have the largest administrative district in the world till the formation of Greater New York. It had an area of 189 square miles, but now New York has taken in 360 square miles. The administrative district of London contains 118 square miles; Philadelphia has 129 square miles; Paris, 30; Berlin, 24. Vienna recently added suburbs, with a population of 464,000, to the old city with a population of 800,000. Leipsig added large suburbs lately, as did also Munich, Dresden and Hanover. The spread of population to the suburbs is shown by the falling off in the rate of increase of population in large cities. In the years 1881-1891 London increased 10.4 per cent., but Essex and Surrey increased treble that amount, those being being the neighboring counties. The population of some towns has actually decreased. The Strand district of London has steadily decreased since 1821; Liverpool had a smaller population in 1891 than in 1881, the real fact being that the population has gone out into the suburbs.

The statistics of London show that the central area has decreased in population; while the population of outer London has increased 50 per cent., and of Greater London 20 per cent. Greater London, the metropolitan police district, contains 690 square miles, and includes every parish any part of which is within 12 miles of Charing Cross. In Berlin the same falling off of the town proper is noticed, for in five years the town increased only 6 per cent. and the suburbs 60 per cent. In New York this is also noticeable. All this means that the movement toward suburban annexation is not a fad, but is simply the legal recognition of new economic conditions. It means that the people all over the world are seeking for a healthier life than that which they can get in large towns. Australia is the paradise of suburban existence, for two-fifths of the population live in the capital cities. The suburban population of Sydney is nearly three times the city population, but with the bicycle and the trolley car it is just as easy to live in comfort outside the town as to live in discomfort inside."

Spitting on Streets Forbidden.

The bureau of police and health officers of Pittsburg, Pa., have placed conspicuously around that city printed signs requesting all persons not to spit on the sidewalks or street crossings. This effort is made in the interest of public health, and if it does not have the desired effect an ordinance will probably be passed fixing a penalty for spitting on the sidewalks.

Good Roads Exhibition in Minnesota.

The Good Roads Association of Minnesota will have permanent headquarters at the state fair grounds, where practical illustrations will be given in the art of scientific road-building. The structure will be a commodious and substantial affair, and will contain an exhibit of surveyors' instruments, model stone-crushers, road graders, levelers, scrapers and other necessary machinery for road-building, besides a selection of literature bearing upon the subject of good roads. Practical tests will be made, also, and the fair association has planned to profit by the work of the machines. James T. Elwell of Minneapolis is president of the association.

Flow of Water Through Pipes.

In a paper read before the Western Society of Engineers, entitled "Locomotive Water Supply," Theodore W. Snow of the U. S. Wind Engine and Pump company gave some examples of the variation between the theoretical flow of water through straight, smooth pipes and the actual flow. He said:

"In designing a water station for a large railroad recently, the problem given was to obtain 4,000 gallons per minute through a distance of 350 ft., the head and size of supply pipe to be sufficient to accomplish this result. The mean head of water supply was made 38 ft.; from this must be deducted 12 ft. for hight of crane, leaving a net head of 26 ft. In computing this flow an allowanace of 10 per cent. was deducted for the friction of the water column. In figuring this discharge, Mr. E. E. Johnson's curve of discharge was used, and comparing actual result with theory, we fell short only 400 gallons per minute.

"This is pretty fair for practice, for considering that all table makers are careful to state than only 'straight, smooth pipes were used' (they want no 'curves'); we laymen have to make due allowance for the cast pipe of commerce, which usually is anything but smooth and not always straight. The bell and spigot connection causes considerable disturbance to the flow, setting up what in electrical parlance would be termed Foucault currents. In the station just referred to, the supply pipe was 12 in. in diameter and the crane 10 in.; the distance, as stated, was 350 ft., and the discharge was 1,600 gallons in 25 seconds, or at the rate of 3,840 gallons a minute. Under the same conditions with 1,000 ft. of 12-in. pipe and a similar crane, this flow was reduced to 3,000 gallons per minute, due solely to friction. Comparing this again with Johnson's curve, above referred to, we find that we should have obtained 3,300 gallons. Again with 350 ft. of 14-in. pipe and a 12-in. crane, with three 90-deg. elbows, we obtained a discharge of 3,500 gallons in 48 seconds, with a net head of 12 ft. A comparison of the same tables will show a uniform discrepancy."

Driven Wells Exhaust an Ice Pond.

The appellate division of the Supreme court of New York has affirmed a decision made in a jury trial, awarding $1,800 damages to Walter R. Smith, who brought suit against the former city of Brooklyn, N. Y., alleging that an artificial pond, from which he obtained ice, had been dried up by the driven wells sunk by the city a few years ago.

Rules for Maintenance of Macadam Pavements.

For the proper maintenance of macadam pavements the Road Improvement Association of London lays down the following rules:

1. Never allow a hollow, a rut or a puddle to remain in a road, but fill it up at once with chips from the stone heap.

2. Always use chips for patching and for all repairs during the summer months.

3. Never put fresh stones on the road, if by cross-picking and a thorough use of the rake the surface can be made smooth and kept at the proper strength and section.

4. Remember that the rake is the most useful tool in your collection, and that it should be kept close at hand the whole year round.

5. Do not spread large patches of stone over the whole width of the road, but coat

the middle, or horse track, first, and, when this has worn in, coat each of the sides in turn.

6. Always arrange that the bulk of the stone may be laid down before Christmas.

7. In moderately dry weather and on hard roads, always pick up the old surface into ridges six inches apart, and remove all large and projecting stones before applying a new coating.

8. Never spread stones more than one stone deep, but add a second layer when the first has worn in, if one coat be not enough.

9. Use a steel-pronged fork to load the barrows at the stone heap, so that the siftings may be available for "binding" and for summer repairs.

10. Never shoot stones on to the road, and crack them where they lie, or a smooth surface will be out of the question.

11. Go over the whole of the new coating every day or two with the rake, and never leave the stone in ridges.

12. Remove all large stones, blocks of wood and other obstructions (used for diverting the traffic) at nightfall, or the consequences may be serious.

13. Never put a stone upon a road for repairing purposes that will not pass freely in every direction through a two-inch ring, and remember that still smaller stones should be used for patching and for all slight repairs.

14. Recollect that hard stone should be broken to a finer guage than soft, but that the two-inch guage is the largest that should be employed under any circumstances where no steam roller is employed.

15. Never be without your ring guage. It should be to the roadsman what the compass is to the mariner.

16. If you have no ring guage, remember MacAdam's advice, that any stone you cannot easily put into your mouth should be broken smaller.

17. Use chips, if possible for binding newly-laid stones together, and remember that road sweepings, horse droppings, sods of grass and other rubbish, when used for this purpose will ruin the best road in creation.

18. Remember that water-worn or rounded stones should never be used upon steep gradients, or they will fail to bind together.

19. Never allow dust or mud to lie on the surface of the road, for either of these will double the cost of maintenance.

20. Recollect dust becomes mud at the first shower and that mud forms a wet blanket which will keep a road in a filthy condition for weeks at a time, instead of allowing it to dry in a few hours.

21. See that all sweepings and scrapings are put into heaps and carted away immediately.

22. Remember that the middle of the road should always be a little higher than the sides, so that the rain may run into the side gutters at once.

23. Never allow the water tables, gutters and ditches to clog up, but keep them clear the whole year through.

24. Always be upon the road in wet weather, and at once fill up with "chips" any hollows or ruts where the rain may lie.

25. When the main coatings of the stone have worn in, go over the whole road, and gathering together all the loose stones, return them to the stone heap for use in the winter to follow, for loose stones are a source of danger and annoyance and should never be allowed to lie on the road.

A City's Liability for Bad Brick in a Sidewalk.

Suit was brought against the city of South Bend., Ind., recently, to recover damages for injuries sustained by a woman who stepped upon a loose brick in a sidewalk, which turned under her foot. The special findings of the jury showed that this particular defect was not known to the city, and, under these circumstances, the appellate court held that it would be a severe rule which would require a city, by its officers, to examine each brick in a sidewalk, to ascertain its condition when there was nothing to indicate a defect in the brick itself or in the manner in which it was laid, and where the walk was even.

Brooklyn Bridge Overburdened.

The Brooklyn bridge, which is so designed and built that, if overburdened, it will give ample notice of danger, sounded a keynote July 28, when the combined weight of a number of vehicles and trolley cars which became blockaded on it caused the main understay to buckle and bend eight inches out of line about 200 feet from the Brooklyn tower. The task of investigating the structure's safety was entrusted to the joint committee on railroads and bridges and tunnels of the council. Samuel R. Probasco, chief engineer, who helped to build the bridge, has caused an examination to be made of the cables in the towers and at the anchorages, the stiffering trusses and the floor beams, and says that "as far as its stability is concerned it is the same now as on previous examination. The overflow stays at the point of connection with the

lower chorals have in several instances caused a buckling of the two channels forming the choral. This is not new, having been noticed and taken care of before; and, as the trusses form no part of the supporting strength of the bridge, which is in the cables alone, it is entirely safe to assume that the bridge is as strong today as it has been at any time since its erection."

Commission on Pollution of Passaic River.

A new commission has just been appointed by Acting Governor Foster M. Voorhees of New Jersey to consider the pollution of the Passaic river. This is the third commission appointed for this purpose. It consists of eight members, who are as follows: William T. Hunt, editor of the Newark Sunday Call; H. C. H. Herold, president of the Newark board of health; Charles W. Fuller, city attorney of Bayonne; James A. Exton, M. D., of Arlington; William Kent, M. Am. Soc. C. E.; Elias J. Marsh, M. D.; John Hinchliffe, mayor of Paterson, and Charles F. Harrington, Bergen county. The members of the commission are to receive not over $1,000 per year for their services, and may expend $25,000 in their work, subject to the approval of the governor of the state.

An Interesting Question as to the Taxation of Water Works.

The question of taxation of water works property in one district, but belonging to another, brought out some interesting legal points recently in Great Britain. The corporation of Liverpool appealed to the high court against assessments made for the benefit of the poor of Hanwyydu. The question at issue was as to whether the Vyrnwy reservoir and works were to be treated for taxation as integral parts of the Liverpool water system or as severable from the rest of the undertaking. The court was of the opinion that such part of the water works as lay within the parish was a separate ratable hereditament in it, and should be rated accordingly upon an estimate of the rent which it would yield after making the statutory deductions. But it must be taken that the reservoir and works were part of the whole undertaking for the purpose of distributing water as a source of profit; and, though they did not directly earn anything in the parish, yet they conduced to earnings elsewhere. The whole undertaking continued in operation, and therefore the owner of the whole must be assumed to pay a contractor adequate remuneration for land and fixed capital vested in these parts of the undertaking, and for the labor and skill required for their construction and maintenance. The reservoir and works were integral portions of the undertaking, and, though ratable separately, were not to be valued apart from the rest of the undertaking.

A California Pavement Worn Away by Sweeping.

The inspector of street sweeping at Los Angeles, Cal., expresses the opinion that unless some other means of cleaning the porphyry streets of that city than by sweeping them with machines is soon adopted by the city council a number of streets of that character will be ruined. He has made a careful examination into the matter and says the effect of machine sweeping on these streets has been to tear off much of the surface, leaving the bare rock unprotected, and this is soon ground to dust by the heavy travel. In the course of his investigations the inspector visited the street sweeping contractor and found that he is building a roadway with the material which he has taken from the streets.

Cement Tests in the Royal Testing Laboratory.

Mr. Max Gary of the Royal Testing Laboratory of Berlin has been investigating accelerated cement tests to determine constancy of volume. The tests made were as follows: First—Drying test in which 100 grams of cement were mixed and placed in a thin cake on a sheet of moist blotting paper lying on a flat glass or metal plate; after setting, the cake is kept in moist air for 24 hours and then heated to 212 degrees Fahrenheit until all the water is driven off. Second—Glow test in which 300 grams of cement are mixed with water into a ball; this is placed on a plate of plaster of paris over a thin iron plate, and heated by a Bunsen burner until all the water is driven off. Third—Boiling test in which 100 grams of cement are made into a thin cake, placed in a moist atmosphere for 24 hours, then immersed in water, which is gradually raised to the boiling point, and kept there for three hours. A comparison of these tests with those for compression and tensile strength led Mr. Gary to the conclusion that a cement may fail under any of them and yet prove reliable in ordinary practice. Inquiries as to the behavior in practice of the cements which accelerated tests indicated as suspicious have shown that not one had proved unreliable.

Experiments in Obtaining Gas for Public Lighting from Sewer Sludge.

Some experiments made by Edward A. Harmon of the city gas works of Huddersfield, with a view to ascertaining whether there were sufficient gases in the sewage sludge of that place to make it worth carbonizing, showed that after a six-day test from 3,680 to 7,200 cubic feet of gas were made per ton of sludge. Its candle power ranged from 7.6 to 16.7, and it contained from 25 to 63 per cent. of moisture. The average moisture in the material was 33 per cent., and the sludge contained large quantities of minute organisms, and as but 5,540 feet of gas of an illuminating power of 12.92 candle was obtainable per ton, on an average, it was not economical to do anything with the refuse.

Can a City Engage in the Plumbing Business?

A suit brought against the town of Waycross, Ga., has been decided against it by the state supreme court. The suit was brought by a citizen, who, when the water works system was built about five years ago, succeeded in building up a business as a plumber. The local water commissioners, claiming that he was unskillful, incompetent and his work unsatisfactory to the patrons of the water system, entered into the plumbing business in their official capacity. In justification of their act they claimed that an act authorizing the city to establish and maintain a system of water works and creating a board of commissioners to control it conferred full power on the municipal authorities to do everything necessary to bring about this result. As "a citizen and tax-payer" the citizen brought suit to enjoin the city's officers from carrying on these business operations, which he claimed were ultra vires. The supreme court ruled that the primary design in creating a municipal corporation is to afford a means of performing certain public functions as a subordinate branch of government, while it is invested with full power to do everything incident to a proper discharge of these functions, no right to do more can ever be implied. Its legitimate duty is to deal with public affairs and not those which are purely private and entirely unconnected with a proper administration of its governmental duties. A legal pitfall was avoided by the plaintiff's counsel when he brought suit for his client as a citizen and tax-payer, for the court held that, had he sued solely as a plumber whose trade was injured by the city, he would have no remedy.

Collection of Ashes and Street Sweepings.

The executive board's investigation in regard to the collection of ashes and street sweepings by the street department force, in Rochester, N. Y., is developing some interesting facts. Testimony that has been taken goes to show that many wagons are sent to the dumps with only half and three-quarter loads, in order that more loads may be drawn in a day. A comparison of tables on the relative ash and dirt collections of 1897 and 1898 shows that more loads were drawn off during 1898 than in 1897, with apparently the same working force.

Legal Standard for Paving Brick.

Judges Hosmer, Carpenter and Lillibridge decided against the board of public works of Detroit, Mich., in a suit brought by Holmes & Strachan to restrain the city from entering into a contract with John McLaughlin as the lowest bidder for paving Atwater-st. The sole question for the determination of the court was whether the limitation of the brick was in violation of charter provisions requiring contracts of this nature to be let to the lowest responsible bidder. The advertisement required each bidder to restrict his proposals to three kinds of brick, the Nelsonville, Metropolitan and Century. The court decided that while satisfied beyond question of the good faith of the members of the board of public works, that the restriction of the bidder to brick made by three manufacturers is, in effect, the same as a restriction to one, and creates a monopoly which at once extends to at least a part, if not the whole contract. The specifications provide that only such brick shall be used as are approved by the board of public works, and, having approved of these bricks made by different manufacturers, they asked for bids for a pavement made of either of the three kinds of brick; that this is illegal; that is to say, three kinds of brick by name cannot be selected for use in paving, and if three cannot be chosen, then ten brick by name cannot be selected. In the court's opinion, a standard may be adopted and the bricks which come up to the standard may be used, and any brand may be adopted as the standard.

A Bureau of Meter Tests in Brooklyn.

A bureau of meter tests will be established in the borough of Brooklyn in compliance with the requirements of section 575 of the charter. This section provides for an investigation of all complaints from house-owners of overcharges, which provision, it

is understood, has been placed in the charter at the request of the different gas and electric companies for their own protection. All gas and electric lights furnished for the city's use will be tested. H. S. Wynkoop, who is at the head of the bureau of electricity, has been placed in charge of the meter-testing bureau.

Steel Shield for Chicago's Great Sewer.

The great steel shield for the Thirty-ninth-st. sewer at Chicago, Ill., has been in course of construction for several months. It has a diameter of twenty-four feet and ten inches, with the outer rim composed of one-inch steel, tested to a pressure of 55,000 pounds to the square inch. Within the steel circlet three platforms will be constructed and divided into eight compartments, and upon these the workmen will be stationed when the shield is in operation. The forward edge of the great circle is sharpened and all the projecting edges of the platforms are sharply pointed. The shield will be forced ahead into the ground by forty-eight hydraulic jack-screws. The soil which is gathered within the shield will then be passed through two doors near the bottom of the rear wall of the machine, and then carried to the opening admitting to the water air, which will be a great distance away when work has proceeded. Ten feet to the rear of the shield air locks will be constructed to keep out the water, and the men within the cylinder will work in an atmosphere of compressed air. Electric lights will be passed within the shield and squads of men will be on duty constantly. Immediately behind the air locks, and in that portion of the bore completed by the excavations, masons will follow and lay the brick conduit. The outer rim will be composed of hemlock timber 3 by 6 inches in size, and cut in segments and then spiked together so that the proper cylindrical form may be secured. Within this rim five thicknesses of brick will be laid. The shield system has never been used in Chicago before, and the leading cases where it has been used were in the St. Clair tunnels, at Port Huron, Mich., and under the Thames, near London.

Technical Meetings.

The first annual convention of the Central States Water Works Association will be held at Springfield, O., September 27, 28 and 29. John Fisher, Secretary, P. O. box 203, Hamilton, O.

The Society for the Promotion of Engineering Education held its sixth annual convention at the Massachusetts Institute of Technology, Boston, Mass., Aug. 18, 19 and 20. Some of the papers presented were as follows: "Notes on the Organization of an Engineering Laboratory," H. B. Smith; "Some Phases of Engineering Education in the South," J. J. Wilmore; "The Study of Electricity in Courses Other Than Electrical," J. P. Jackson; "Laboratory Instruction in Electrical Engineering for Civil Engineers," W. R. Hoag; "Notes on Some Methods in Use in an Engineering Laboratory," F. C. Caldwell; "Sanitary Science as a Part of Every Science Course," W. T. Sedgwick.

The annual meeting of the American Street Railway Association will be held in Boston, Mass., Sept. 6-9.

The annual convention of the Association of Edison Illuminating Companies will be held at Sault Ste. Marie, Mich., Sept. 12-13.

The Missouri Good Roads and Public Improvement Association will hold a convention, Sept. 8, in St. Joseph, Mo. H. Moore, Prest.

The sixth annual convention of the Pacific Coast Gas Association was held at San Francisco, Cal., Aug. 19-20. Officers were elected as follows: President, Chas. F. Adams, Portland, Ore.; vice-president, J. Clements, Red Bluff, Cal.; secretary and treasurer, John A. Britton, Oakland, Cal.

The first annual meeting of the American section of the International Association for the Testing of Materials was held in Philadelphia, Aug. 27. The officers of the American section are: Chairman, Prof. Mansfield Merriman; vice-chairman, Prof. Henry M. Howe; secretary, Richard L. Humphrey; treasurer, Paul Krenzpointer; members of international advisory council, Dr. R. G. G. Moldenke and Prof. Henry M. Howe.

At a meeting of the Civil Engineers' Club of Cleveland, held Aug. 9, a paper on "Test Meters for Boiler Plants" was read by Lehman B. Holt, who, after describing the requisites of a water meter as attached to a service pipe to measure the total consumption, emphasized the importance of accuracy of record in meters used to measure boiler feed water. A Worthington meter was exhibited and described, and blue prints of the Worthington steam accumulator were exhibited, by request, and its construction and operation described.

New Publications.

Fourth Annual Report of the American Society of Municipal Improvements.

The report of the Nashville meeting of the American Society of Municipal Improvements, just published, makes a volume of 336 pages, in addition to which there are a number of diagrams and plates illustrating

the text. It gives a complete verbatim report of the papers and discussions at the meeting and is a valuable document to municipal officials.

Annual Report of the Water Department of the City of Galesburg, Ill., for the fiscal year ending March 31st, 1898.

The financial statement of the superintendent, W. F. Inness, shows that the total cost of construction of the Galesburg works, up to date, have amounted to $227,811.20. The superintendent expresses a preference for rotary meters. The water pumped during the year increased over 31,000,000 gallons, accounted for by added service connections.

Report to the Director of Public Improvements on Improvement and Repairs to the West Side Levee, Columbus, O. By Julian Griggs, Chief Engineer.

The city of Columbus has experienced much trouble from overflows of Scioto river. In his report Mr. Griggs recommends that what are known as the West Side levees and the railroad embankments which act as levees be raised six feet above the highest stage of flood water, and that the railroad crossing in that region be elevated so as to separate the grade of the streets by passing the railroads over them. The report sets forth complete data in support of his recommendations, which are fully and clearly discussed for the information of those concerned.

Twenty-fifth Annual Report of the Board of Public Works to the Common Council of the city of Grand Rapids, Mich., for the fiscal year ending April 30, 1898.

The report of City Engineer Ames shows that the total cost of street improvements on which contracts have been awarded will amount to $232,928. The cost of sewers during the year was $14,860 and on water works construction, $26,859.

PERSONAL INFORMATION.

CASE—The information that Mr. L. N. Case has been deposed from the position of superintendent of the Detroit water works will be rather astounding to the water works people of the country, among whom he was widely known. According to Detroit newspapers the change has been brought about by political influences, which constitute such a serious menace to good servants of the public in American municipalities and which are constantly working mischief. Mr. Case has been officially connected with the Detroit water works for thirty-one years and is recognized as one of the most capable water works managers in the country. When eighteen years old he enlisted as a private in the federal army, and advanced, step by step, to the rank of captain. As such he was in command of his regiment April 2, 1865, when but twenty-two years of age, in a charge on the enemy's works and so distinguished himself as to be brevetted major by order of Gen. Parke, commanding the Ninth Army Corps. He returned home at the close of the war and obtained an appointment as collector in the water department of Detroit. Jan. 1, 1889, he was appointed to his present position. His management of the Detroit water works has caused him to be regarded as an authority among the water works managers of the country. He was elected vice-president of the American Water Works Association at Buffalo this year, and has been talked of as the next president. After deposing him as Superintendent, the water commissioners assigned him temporarily the duties of acting secretary while the secretary is absent on duty in the army.

GREENE—Among the most recent promotions in the army made on the order of President McKinley is that of Brigadier-General F. V. Greene, who is advanced to a Major-General. Gen. Greene is the President of the Barber Asphalt Paving Company. He entered the military service for the Spanish war as Colonel in command of the Seventy-first regiment of New York. Soon after going with his regiment to Florida he was promoted to the rank of Brigadier-General and was sent to Manila in charge of the second expedition. He was one of the distinguished heroes in the battle at Manila which resulted in a victory for the American army, and his promotion to the rank of Major-General is in recognition of his services on that occasion. A sketch of Gen. Greene appeared in the July number of this magazine, in which it was predicted that he would rapidly advance in rank.

BLACK—The mayor of Columbus, O., Samuel L. Black, who was elected president of the League of American Municipalities at the Detroit meeting, objected to the use of his name for the position when the first meeting was held at Columbus for personal reasons. He served as treasurer, however, and it was well understood that he was not in sympathy with the official irregularities in the organization. He protested against these, called the attention of other officers

to them, and declared himself at Detroit against countenancing the irregularities. After he had been elected president and had accepted the office, the League took action which was contrary to what had been well understood to be his position and judgment. He has expressed the determination to try

SAMUEL L. BLACK,
MAYOR OF COLUMBUS, OHIO.

to put the organization on a higher plane and to relieve it from its embarrassments. Hope for its reform and possible usefulness rests largely on what he may be able to accomplish in this direction. Mr. Black is a young man, about 37 years old, and prior to his election was engaged in the practice of law.

SUTRO—Adolph Sutro, ex-mayor of San Francisco, Cal., died Aug. 8, aged sixty-eight years. Ex-Mayor Sutro was known as the "Grand Old Man of the Pacific Coast." He was born at Aix-la-Chapelle, Prussia. He received a liberal education, and, after business reverses in his own country, he came to the United States, starting almost immediately for California. He engaged first in mercantile pursuits, but later in mining. When visiting the Comstock lode in 1860 he conceived the idea of tunneling the lode, and, with the co-operation of forty-one companies operating on the lode, the work was commenced. He was elected mayor of San Francisco four years ago, and served one term.

POULLAIN—Mr. F. N. Poullain of Paris, France, has been making a tour of the leading cities of the United States during the last three months for the purpose of gathering information on street-cleaning methods in this country, and has been giving special attention to machinery of this kind, with a view to introducing some of it in Paris. He reports that he has been favorably impressed by his observations and will return with some valuable information.

Personal Notes.

J. Foucart has been appointed city engineer at Guthrie, Okla.

Prof. E. E. Lawson has established an office as civil engineer and surveyor at Dayton, Pa.

J. C. Hoggett has been elected water commissioner, to succeed R. J. Gross, resigned, at Dunkirk, N. Y.

George V. Lorings has been appointed city engineer at Decatur, Ill., to succeed Mr. Dickinson, resigned.

H. H. Flagler has been elected president and A. A. Kelly secretary of the water company at Fond du Lac, Wis.

J. F. Berties has been re-elected superintendent of the Green Bay Water Works company at Green Bay, Wis.

A. E. Carlton has been appointed trustee and William Gilpatrick manager of the water works at Altman, Col.

Edwin G. Nicewaner has been appointed chief engineer of the meter division of the water department at Chicago, Ill., to succeed H. C. Larrabee, resigned.

Benjamin G. Ingalls, Chas. S. Haskell and M. V. B. Jones have been appointed water commissioners at Swampscott, Mass.

Mrs. Sophia Braeunlich, business manager of the Engineering and Mining Journal, died at her home in Brooklyn, N. Y., Aug. 11.

Robert Campbell Gemmell, M. Am. Soc. C. E., Salt Lake City, Utah, has been appointed State Engineer by Governor Wells.

William Gardner, engineer for gas plants and manufacturer for fire clay materials for gas works, formerly of Pittsburg, Pa., died at his home in Colorado Springs, Col.

Edward M. Bigelow, M. Am. Soc. C. E., director of the department of public works, Pittsburg, Pa., sailed for Europe Aug. 13.

E. Anderson has been appointed city electrician and chief engineer of the water and electric light plants of Grand Forks, B. C.

Walter C. Allen, formerly inspector of electric lighting in Washington, has been appointed electrical engineer of the District of Columbia.

Jacob L. Kuehn has severed his connection with the York Water company, York, Pa., of which he has been superintendent for a number of years.

Capt. James C. Sanford, Corps of Engineers, U. S. A., has been placed in charge of the construction of a military road at Fort Washington, Wyo.

Albert E. Loomis has been appointed a member of the board of sewer commissioners, to succeed John V. Richardson, resigned, at Oneida, N. Y.

F. C. Kelsey has been appointed chairman of the board of public works at Salt Lake City, Utah, to succeed C. L. Haines. Messrs. Frederick A. Hale, John T. Caine, S. M. T. Siddon and George Stringfellow

have also been appointed members of the board.

W. M. Deutch, recently with the New York Filter Manufacturing company, New York City, has been appointed general manager of the Continental Filter company.

Ernest W. Bowditch, Jun. Am. Soc. C. E., Boston, Mass., has resigned his position as consulting engineer and landscape gardener of the park board of Cleveland, O.

Charles F. Leland, Erastus Upham, Gales Gilbert, Harrison E. Smith and C. E. Duncan have been appointed commissioners of the water and light department of Duluth, Minn.

Clifford Lewis, Jr., city surveyor at Utica, N. Y., has resigned to accept the position of inspector of bridges on the middle division of the New York Central & Hudson River R. R.

Joseph T. Lowry has been elected to serve the unexpired term of Thomas E. Veal, chief inspector of the sanitary department of Atlanta, Ga., who has resigned to accept a position with the Thackeray Incinerating and Fertilizing company of San Francisco.

J. W. Beardsley, C. E., has resigned his position with the sanitary district of Chicago to accept that of assistant engineer under the Board of Engineers on the Deep Waterways Commission, with headquarters at Ogdensburg, N. Y.

W. C. Drake has been appointed superintendent of the asphalt paving works for the Barber Asphalt Paving company in Sioux City, Ia., to succeed E. B. Demarest, who has gone to Kansas City, Mo., to accept a similar position.

MACHINERY AND TRADE.

Recent Inventions.

(Reported specially for MUNICIPAL ENGINEERING, by Arthur M. Hood, Indianapolis, Ind. Copies of any patent may be obtained for 10 cents.)

608,405—Aug. 2, 1898—Hoisting and Conveying Apparatus for Excavating. P. N. Jonte, Cincinnati, O.

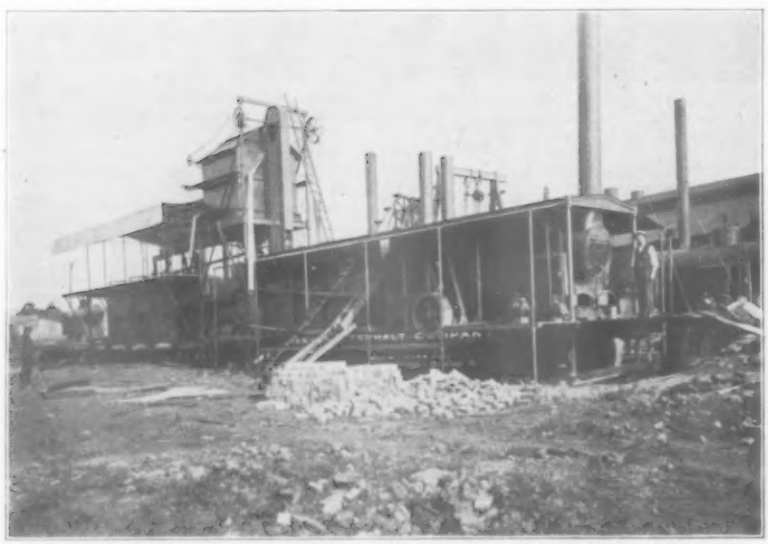
609,001—Aug. 16, 1898—Construction of Metal Bridges. Walter Beer, London, England.

A hand machine carrying a rotary brush at its forward end.

609,182—Aug. 16, 1898—Dumping Vehicle. W. A. Cowley, Benicia, Cal., assur. to Baker & Hamilton Company, San Francisco.

A semi-cylindrical body which may be swung about a horizontal axis.

609,321—Aug. 16, 1898—Apparatus for Raising Sewage. S. H. Adams, London, England.



NEW RAILWAY ASPHALT PLANT MADE BY HETHERINGTON & BERNER.

A pair of balanced cantilevers are mounted, one at each side of the stream, and the adjacent ends are connected by an overspringing arch the ends of which abut against the ends of the cantilevers.

609,113—Aug. 16, 1898—Street Sweeper. Samuel Moore, Wilmington, Del.

Pneumatic Street Sweepers in Rochester.

Mr. H. T. Powell, secretary of the Vulcanite Paving company of Rochester, N. Y., in a letter published in the Rochester Democrat-Chronicle on August 16th, says regarding the use of pneumatic street

sweepers in that city: "Last winter the representatives of the Indianapolis Street Cleaning company made a one-sided contract with the city of Rochester, to sweep asphalt, Medina block or brick pavements, guaranteeing to take up all the fine dust and other dirt, and failing to do so the city of Rochester have the right to cancel said contract at any time without loss to the city. The two pneumatic machines came, one May 1st and the second June 1st. The first month the bill to the city was about $259.97, and it swept five miles of the streets of Rochester every night of the month of May, and paid to the citizens of Rochester employed to run said machines $300 in wages. During the month of June, while two machines were being used, the bill to the city was $849.27, and they swept acceptably ten miles of streets each night, and paid to the citizens of Rochester employed to run them $780 in wages. In July the city paid $1,030 and the owners of the machines paid over $800 to Rochester citizens in wages. The city has also had men on the streets in the day time, and any person living on an asphalt street will tell you that since the machines have been placed on their streets they have not been covered with dust as they were when the city had only hand labor on it. The man who says the machines will injure an asphalt pavement doesn't know what he is talking about. I am an asphalt contractor and I know that the suction of air, which is the principle of the machine cannot injure any pavement. The steel brushes only loosen up any horse droppings and have nothing to do with the sweeping. The Furnas pneumatic street sweeper has never been tried and thrown out of any city in the United States. Also, there has been no small contractor thrown out of a job by the machines, as the machines have only swept the streets that were placed in the hands of the executive board by the common council to take care of out of the highway fund."

Paving Bricks from Copper Slag.

The Mansfield Copper company in Eisleben, Thuringia, has placed on the German market a paving brick made from copper slag. The slag is led directly from the smelting furnaces into iron moulds possessing a capacity of thirty-six bricks each. If it were poured into cold moulds and allowed to cool off in the air it would become a useless glassy mass, so hard and brittle as to be unable to stand ramming and the shock of wagon wheels. The moulds have, therefore, to be well heated if a good brick is to be obtained. Immediately after pouring, the moulds and their contents are thickly covered with sand and allowed to stand undisturbed for at least seventy-two hours. It requires this time to make the bricks cool enough to be taken out of the moulds with tongs, and they have then gone through a regular annealing process. After having fully cooled each brick is tested by a strong blow with a hammer, and those containing blowholes crack. These bricks are said to be fully equal to granite, and possess the further advantage of regular shape and sharp edges so that they can be joined very closely.—Engineering and Mining Journal.

Trade Notes.

The Sharon Clay Mfg. company, Meadville, Pa., has resumed operations.

The Thomas Millan & Co. Portland Cement Works of Wayland, N. Y., is being enlarged.

The common council at Scranton, Pa., is again talking of purchasing an asphalt repair plant.

A large kiln of the Galesburg Paving Brick company, Galesburg, Ill., was struck by lightning recently.

A Portland cement plant has been erected on Green Island, China, near Hong Kong, by an English syndicate.

The asphalt yards of Booth & Flynn, Pittsburg, Pa., were damaged by fire Aug. 2, causing a loss of about $4,000.

The question of erecting a plant to develop the deposit suitable for cement manufacture, which has been found near Mulvane, Kas., is receiving consideration.

Press reports state that all of the paving brick factories east of Galesburg, Ill., may resume work within a short time.

The Lower Brick company, Sioux City, Ia., has been incorporated by W. B. Lower, S. R. Clarke, E. W. Rice and A. L. Steison.

The New Castle Block Asphalt company, New Castle, Pa., contemplates the establishment of a branch factory in Sandusky, O.

A stone crushing plant has been established in the "North Woods," about 1½ miles east of Le Roy, N. Y., by the Lehigh R. R. company.

The Central Grading company, San Fransisco, Cal., has been incorporated by John Mahoney, John H. Conley, Joseph Oliva, A. Sharkey and Jas. McGinley.

The South Bend Portland Cement company, South Bend, Ind., has been incorporated. The directors of the company are John Lux, Chas. H. Atkinson, Aman Moore and Lee W. Atkinson.

The Rincon mines of the Alcatraz Asphalt company, which are situated about eight miles from Santa Barbara, Cal., have resumed operation and will be extended as fast as conditions will allow.

Plans are being prepared by Lathbury & Spackman, consulting engineers, for the proposed plant of the Alma Portland Cement company of Wellston, O., for the manufacture of cement. C. K. Davis is interested in the enterprise.

The injunction restraining Cornelius N. Bliss, Secretary of the Interior, and William A. Jones, commissioner of Indian Affairs,

from declaring at an end a mining lease in Utah, held by the American Asphalt company, was dissolved July 29 by Justice Hagner in Equity Court No. 1.

A judgment of $8,000 has been awarded the Atlas Clay Material company of Chicago in its suit for $20,000 against the Ohio Vitrified Pipe company. The amount asked for was commission, with interest, from Jan. 1, 1895, for selling the product of the United States Clay company of Lisbon, O., in various parts of the United States. The plaintiff company had a contract with the company to sell its goods, for which it was to receive a commission of 15 per cent., but it never received any part of such commission when the United States Fire Clay company became insolvent and a receiver was appointed two years ago. When the stockholders organized the Ohio Vitrified Pipe company for the purpose of carrying on the business and assuming all liability of the old company the Atlas company instituted suit for judgment.

SELECTIONS FROM THE PRESS.

Reformed Municipal Bookkeeping.

Last week the League of American Municipalities had a meeting at Detroit, and recreated itself by uttering and hearing a lot of talk about various municipal and miscellaneous reforms and improvements. The Hon. Potato Pingree radiated wisdom over the august assembly, and the inevitable Socialist professors were on hand with their usual invoices of sentimentalism and "sociology." In short, much thought was discharged.

Even among thinking reformers and reformed thinkers and municipal leaguers, the election of officers has its excitements. The spirited manner in which the Hon. B. F. Gilkison was re-elected as secretary of the League sufficiently marked its capacity for improving municipal government. The auditing committee had made a report "criticising Secretary Gilkison's laxity in keeping his accounts and his failure to turn over the dues to the treasurer. The committee found nothing wrong with his accounts, and had no reflection to make upon his honesty or integrity." * * * Evidently the League of American Municipalities intends to reform mtunicipal bookkeeping, making it more genial and less painfully businesslike.—The New York Sun.

A Bright Business Outlook.

When in our history has the business outlook of the country been so conspicuously favorable as at this moment? When has there been such a conjunction of fortunate influences of the first magnitude?

To begin with, there is peace, now pretty certainly hovering so near us that her wing-beats will presently be heard. Although the war has ceased to be a very serious drag on business, the stopping of a war expenditure of something like a million dollars a day will be helpful and stimulating.

Then the national domain and the national wealth are about to be augmented by the acquisition of Porto Rico, a highly productive island 50,000 miles in extent, with two and one-half millions of population, yielding coffee, sugar, fruits, nuts and tobacco. It has an export and import trade aggregating $36,000,000 annually, and is capable under American management of increasing immensely in population, productiveness and wealth.

We have a credit balance of six hundred million dollars in our trade with foreign nations for the fiscal year just closed. We owe far less abroad than we have owed at any other time in the last fifteen years, because we have been buying back our securities, and buying them cheap. Accordingly we have less interest money to pay to foreigners. Already gold imports have begun, a most unusual thing for this season of the year. But Europe has no other way of paying its debts to us. The offsets that used to eat up our trade balance are not equal to the task of disposing of $600,000,000.

Another great crop is nearing the harvest time, and another year of large exports is before us.

We produced $60,000,000 of gold last year and $33,000,000 worth of silver. The Klondike region has begun to send in its second year's yield, which must be considerably larger than the output last year.

Our money circulation has been very largely increased during the last two years, and the use of the new 3 per cents by the banks will result in important increase in the volume of money. Cheap money facilitates business.

The business of the country is in an unusually healthy condition. There is ample confidence, a buoyant belief in the future, and courage and enterprise equal to the opportunities that invite them.—New York Times.

IMPROVEMENT AND CONTRACTING NEWS.

PAVING.

Clinton, La.—A committee of three has been appointed by the police jury to plan a system of laws for improving the roads.

Milwaukee, Wis.—The board of public works has admitted Alcatraz asphalt to competition.

Detroit, Mich.—The board of public works announced, Aug. 24, that it will use any brick for paving that the council will select.

Ashland, O.—A committee of councilmen, consisting of O. A. Phillips, C. Smith, H. Tinsley, Wm. Boren, F. L. Neidenhauser and W. B. Dager, visited Columbus, O., Aug. 7, to investigate foundations for street paving.

Lafayette, Ind.—The council committee on streets has decided against creosoted block as a paving material, and is now investigating asphalt block paving, which has been suggested, owing to its adaptability on such grades as exist in this city.

Maryville, Mo.—The Nodaway county branch of the Missouri Good Roads and Public Improvement Association was organized Aug. 18 with the following officers: President, Dr. H. E. Robinson; vice-president, A. E. Alden; secretary, W. F. Smith; treasurer, Jas. B. Robinson.

Liberty, Mo.—The Clay County Good Roads and Public Improvement Association was organized here Aug. 9. The officers are: President, J. J. Stogdale; secretary, B. W. A. Gow; treasurer, D. B. Field. A meeting will be held in September to elect delegates to the state convention, which will be held in St. Louis in November.

Newark, N. J.—The paving laid in this city this year will exceed the amount ever before done in any one year. Of this, 37 streets, having an area of 188,245 square yds., will be asphalt, 17 streets, with an area of 78,831 square yards of granite block, and five streets, with an area of 10,890 square yards, of brick. The cost will amount to $533,575.

Norwich, N. Y.—The property-owners on Main-st., from Court to Adelaide, have issued an injunction against the board of trustees restraining it from letting the contract for paving the street, because of alleged irregularities in the proceedings relative to the paving, which, they claim, would endanger the collection of the taxes assessed. The street was to be paved with vitrified brick.

Sioux City, Ia.—City Attorney Gill favors more competition in paving and is of the opinion that the municipalities of the state should make an effort to have the law so changed that the decision as to the material to be used be left until after bids on different materials have been received and the city has gotten the benefit of the increased competition which would naturally result.

St. Louis, Mo.—Acting President Holman of the board of public improvements is of the opinion that it will be impossible to secure the construction of any new streets during 1898. The adjournment of the municipal assembly for two months without acting on the 22 improvement ordinances passed by the board of public improvements, is the cause of the delay. The assembly re-convenes Sept. 27.

Philadelphia, Pa.—The property-owners on Locust-ave., Germantown, entered a protest Aug. 18 against the alleged excessive price charged for paving that thoroughfare with brick. The pavement has just been completed by the Mack Paving company, who, it is alleged, was awarded the contract three years ago, when property was assessed at suburban rates and before sewer and other improvements had been made. The contract price was $2.06 a sq. yd., while similar work is now being done at $1.39.

Waco, Tex.—The county commissioners are improving the sandy sections of the public roads east of the Brazos river by constructing clay beds on one side of the road for use in dry weather and leaving the other side of the road as it is for use in wet weather. While the improvement is in the nature of an experiment, yet it is not altogether an untried one, for several of the counties represented in the last two annual meetings of the County Judges' and Commissioners' Association reported that this method of improving sandy roads is satisfactory.

CONTEMPLATED WORK.

Rahway, N. J.—Seminary-st. will be macadamized.

Aurora, Ill.—Street paving is urged by the press.

Kenosha, Wis.—Grand-ave. will be paved with brick.

Westminster, Md.—Main-st. will be macadamized.

Sioux City, Ia.—Macadam pavement is contemplated for Fourth-st.

Vineland, N. J.—The construction of a brick road is contemplated.

York, Pa.—An issue of $200,000 bonds for paving is contemplated.

Flint, Mich.—The council has ordered brick paving for Kearsley and Beach-sts.

South Bend, Ind—Paving is proposed for Portage and Leland-aves. and Cushing-st.

Denver, Col.—As an experiment Logan-ave. will be paved with disintegrated granite.

Burlington, Ia.—Brick paving is contemplated for alley No. 1, from Valley to Market-st.

Leadville, Col.—Senator Edward L. Taylor advocates the construction of a state road.

Elgin, Ill.—An ordinance was passed Aug. 16 to pave Chicago-st. with brick. Mayor Price.

Tacoma, Wash.—Surveys have been ordered made for a wagon road 22 mis. long. Co. comrs.

Leavenworth, Kas.—The committee is reported as having decided upon brick for paving Fifth-st.

Springfield, Mo.—The city council has passed an ordinance to pave E. Walnut-st. with brick.

Dayton, O.—The city engineer has been instructed to prepare ordinances for paving two alleys.

Eau Claire, Wis.—An ordinance has been passed for 9,165 sq. yds. of brick paving for this fall.

Minneapolis, Minn.—Brick paving is contemplated for a portion of University-ave. Ald. Lane.

Winnipeg, Man.—Macadam paving is contemplated for Lombard and Arthur-sts., and Gotham-ave.

Mauch Chunk, Pa.—The town council has voted to construct about 700 sq. yds. of Macadam streets.

New York City.—Asphalt paving is contemplated for Sixth-ave., between Thirteenth and Thirty-third-sts.

Kokomo, Ind.—Bids will be asked soon for 12,000 sq. yds. of brick paving. A. W. Smith, cy. engr.

Welland, Ont., Canada.—Asphalt paving is contemplated for a portion of the roadway in the park.

Marion, Ind.—An asphalt boulevard, from the Public Square to the Soldiers' Home, has been suggested.

Jackson, Mich.—The common council is undecided as yet whether to pave Wildwood-ave. with aspnalt or brick.

Woodbury, N. J.—William N. Carter has been appointed to prepare plans for macadamizing ¾ mi. of Broad-st.

Sheboygan, Wis.—The citizens are urging the question of paving or macadamizing Pennsylvania-ave.

Astoria, Ore.—Resolutions have been adopted for establishing grades on certain streets, Mayor Bergman.

New Kensington, Pa.—The borough council decided to pave Fourth and Fifth-aves., and Ninth and Tenth-sts.

Hazleton, Pa.—The vitrified brick paving on Broad-st. will be extended from 18,000 to 21,000 sq. yds.

Lexington, Ky.—Press reports state that the proposition to pave Vine-st. with asphalt is still under consideration.

Milton, Pa.—An ordinance has been passed to pave Broadway and Front-sts. with brick. William C. Miller, clk.

Council Bluffs, Ia.—The resolution to pave a number of streets with brick came up for final action Aug. 29.

Washington, Pa.—The question of issuing $67,000 bonds for paving next year will be voted on Sept. 17.

Jefferson City, Mo.—Brick paving is contemplated for one block of Machine-st. Ald. McHenry is interested.

Chicago, Ill.—The property owners and business men on N. Clark-st. have petitioned for asphalt paving on that street.

Wauwatosa, Minn.—The common council passed a resolution, Aug. 23, to pave Church-st., from Main to W. Milwaukee-ave.

Pana, Ill.—Paving is contemplated for Third-st., from the Illinois Central railway to Hickery-st., eight blocks.

Waukesha, Wis.—The council has ordered brick paving for Madison, Broadway, South and Clinton-sts. H. E. Blair.

Cincinnati, O.—A resolution has been passed to macadamize Delta-ave., from Linwood road to Center-st., Edwin Henderson, clk.

Newburg, N. Y.—Plans and specifications have been prepared for paving Liberty-st. with asphalt block. D. J. Contaut, cy. clk.

Buffalo, N. Y.—The board of supervisors has voted in favor of macadamizing the White Corners road; estimated cost, $36,400.

Springfield, O.—Resolutions have been passed to grade and gravel portions of ten streets. Philip Huonker, cy. clk.

Clayton, Mo.—The St. Louis county court granted 21 petitions, Aug. 17, for road improvement, covering 14 mis. of Telford paving.

St. Paul, Minn.—Plans have been submitted for paving Washington-st., from Third to Seventh, with asphalt. L. W. Rundlett, cy. engr.

Winnipeg, Man.—Asphalt paving is proposed by the council for Portage-ave., from Main to Hargrave-st.; estimated cost, $54,000.

Racine, Wis.—Macadam paving with stone curbing is contemplated for Kewaunee-st. Cement walks have been recommended for Seventh-st.

Waukegan, Wis.—Press reports of Aug. 16 state that a movement has been started to pave West-st. with asphalt and rename it Dewey-ave.

Lockport, N. Y.—The property owners on Canal-st., between Main and Niagara, have petitioned the common council to pave and curb that street.

Canton, Ill.—A petition has been filed with the city clerk asking that the alley between S. Main-st. and White Court be paved with brick.

Lansdowne, Pa.—The citizens will vote on a proposition to borrow $15,000 for improving the streets. Thos. G. Janier, borough surveyor.

Louisville, Ky.—The board of public works has decided to improve a large number of sidewalks, alleys and streets with brick and block paving.

Durham, N. C.—Resolutions have been passed for paving Main-st. and the sidewalks. Vitrified brick or Belgian blocks will be the material used.

Des Moines, Ia.—A resolution has been adopted for paving Depot-st. with vitrified brick, on 6-in. concrete foundation, with Murphy grout filler.

Boston, Mass.—The street commissioners will grant a public hearing Sept. 1 on the proposed paving of Rockford and Nottingham-sts. at Dorchester.

Scranton, Pa.—The city council has decided, according to press reports, to readvertise for bids for paving River-st., Park Place and Sixth-ave. Cy. clk.

Madison, Wis.—Petitions have been presented to common council for the macadamizing of four streets. W. Johnson and Warren-sts. will be macadamized also.

San Francisco, Cal.—The board of supervisors decided Aug. 15 that the Market-st. Railway company must repair the car tracks on Market-st. with bitumen.

Boonville, Ind.—A resolution was passed Aug. 15 to macadamize Third-st., from Locust-st. to the L. E. & St. L. tracks. Chas. H. Johnson, town clk.

Des Moines, Ia.—The council contemplates improving nine streets at a cost of about $8,000. A petition is being circulated for asphalt bicycle paths.

Atlantic City, N. J.—The city council adopted an ordinance Aug. 15 to pave all avenues with broken stone, with vitrified brick gutters and stone curbing.

Youngstown, O.—Bids will be asked about the middle of September for about 7,800 sq. yds. of sheet asphalt or block paving on Scott-st. F. M. Lillie, cy engr.

Joliet, Ill.—The council has recommended to the board of local improvements that S. Chicago-st., between Washington-st. and Fifth-ave., be paved with asphalt.

Hooperston, Ill.—The city council will, according to press reports, want estimates on asphalt paving for one of the residence streets. J. L. Hamilton, Jr., mayor.

Grand Forks, N. D.—This city contemplates about 4 miles of cedar block paving and macadam, sandstone or brick, with

sandstone or granite curbing. Correspondence from contractors is solicited. Alexander Oldham, cy. engr.

Champaign, Ill.—The property-owners on University-ave. are agitating the question of paving that street and replacing the brick sidewalks with concrete. Mayor Scott.

Kansas City, Mo.—The park board instructed its secretary Aug. 17 to make preliminary surveys for a 100-ft. boulevard on Cherry-st., from Seventeenth-st. to Brush creek.

Conshohocken, Pa.—The town council has passed an ordinance to pave, curb and gutter Cherry-st., between Elm-st. and the Pennsylvania railroad. Harry B. Heywood, clk.

Joliet, Ill.—A petition is being circulated for the purpose of securing asphalt paving in the alleys in the block bounded by Chicago, Jefferson, Ottawa and Van Buren-sts., this year.

Council Bluffs, Ia.—The city council met Aug. 22 and acted finally upon the resolution for vitrified brick paving on Avenue F, Pierce, First, Bryant, N. Main and Fourth-sts. and Willow-ave.

Cedar Rapids, Ia.—(Special.)—G. H. Meredith, cy. engr., has been directed by the city council to prepare plans and specifications for asphalt paving on First-ave., from Tenth to Thirteenth-st.

Schenectady, N. Y.—Ordinances are before the council for brick paving in three streets, macadamizing North-st. and grading, curbing, etc., in Hamilton-st. Louis R. Sebring, cy. engr.

Niagara Falls, Canada.—(Special.)—C. H. Mitchell, cy. clk., says 8,700 lin. ft. of 6, 8 and 10-ft concrete and brick sidewalks, together with stone curbing and crossings, are soon to be built.

Williamstown, Pa.—An ordinance has been passed by the borough council empowering the council to pave those parts of Broad, Elizabeth, Spruce, Vine, Julian, Ray and Chestnut-sts. not paved by Oct. 2.

Rochester, N. Y.—The council contemplates paving, curbing and constructing sidewalks in portions of Maple, Post, Front and Center-sts., Chili and Hudson-aves. and Immel-place. Edwin A. Fisher, cy. engr.

Omaha, Neb.—The residents of Poppleton-ave. are reported as having decided in favor of asphalt paving. The property-owners on Twenty-fourth-st. want the asphalt paving on that thoroughfare renewed.

Chicago, Ill.—Ordinances have been passed for paving portions of State, Thirty-third and Thirty-second-sts. and Lake Park-ave. with asphalt, and Leavitt-st. with cedar block. L. E. McGann, comr. pub. wks.

Bay City, Mich.—South Union-st., from Washington to Henry, will be paved. Both brick and asphalt are favored. Bids will probably be asked on both board and concrete foundations. Mayor Lind.

St. Paul, Minn.—The board of public works decided, Aug. 18, to report favorably to the council on the proposed paving of Washington-st. with asphalt, provided that work on it will not begin before Feb. 1, 1897.

Hamilton, O.—A resolution has been adopted for paving N. Second-st., from High to Black, and S. Second, from High to Central-ave., with asphalt block, asphalt or vitrified brick. Macadam paving is proposed for Ludlow-st. M. O. Burns, cy. clk.

St. Paul, Minn.—Asphalt paving is contemplated for Nelson, Nina and Farrington-aves., and Kent, Mackubin and Arundel-sts., but it is not the intention to pave them this summer. The board of public works will recommend to council that 6¾ miles of city streets be paved this year with macadam.

Lafayette, Ind.—The committee on streets reported Aug. 23, that after examination of streets paved with asphalt blocks, it was disposed to let them enter into competition with asphalt, and have asked the council to have paved with them one or more prominent street intersections. D. W. Leslie, Geo. Pfrommer, M. W. Thompson, com. on sts.

CONTRACTS TO BE LET.

Salem, O.—Bids are invited until Sept. 6 for brick paving. Geo. Holmes, cy. clk.

Fremont, O.—Bids are asked until Sept. 5 for brick paving. R. J. Christy, chrmn. com.

Nelsonville, O.—Bids are invited until Sept. 10 for block paving. Jas. Sharp, cy. clk.

Rockville, Md.—Bids will be received Sept. 6 for constructing the Rockville turnpike. Co. comrs.

Cincinnati, O.—Bids are asked until Sept. 2 for macadamizing. A. B. Ratterman, prest. bd. cy. affairs.

Sturgis, S. D.—Bids will be received until Sept. 5 for building a highway. W. A. McMichael, audt.

Hasbrouck Heights, N. J.—Bids are asked until Sept. 6 for macadam paving. G. H. Ramsden, clk.

Watertown, Wis.—Bids are asked until Sept. 17 for 5,700 sq. yds. of brick paving. G. H. Stanchfield, cy. engr.

Port Chester, N. Y.—Sealed proposals will be received until Sept. 6 for paving sundry sts. J. A. Peck, vil. clk.

Mansfield, O.—Bids are invited until Sept. 10 for street improvements and lateral sewers. F. M. Remy, cy. clk.

Cleveland, O.—Bids are asked until Sept. 7 for paving E. Madison-ave. with brick. Geo. R. Warden, dir. pub. wks.

St. Paul, Minn.—Bids will be received until Sept. 5 for paving Rice-st. with macadam. D. M. Sullivan, co. audt.

New Brunswick, N. J.—Bids are asked until Sept. 7 for macadamizing. Jas. M. Powers, dir. bd. chosen freeholders.

Hawley, Minn.—Sealed bids will be received until Sept. 3 for grading 45 rods, more or less. Warren Works, town clk.

South Bend, Ind.—Sealed proposals will be received until Sept. 12 for constructing cement sidewalks. L. A. Hull, cy. clk.

Buffalo, N. Y.—Bids will be received until Sept. 2 for street work in Niagara Square. G. L. Selkirk, secy. park com'n.

Henderson, Ky.—Bids will be received until Sept. 6 for 2,000 cu. yds. of conglomerate gravel. W. I. Thompson, mayor.

Logansport, Ind.—Sealed proposals will be received until Sept. 21 for constructing cement sidewalks. John B. Winter, cy. clk.

Denver, Colo.—Bids will be received until Sept. 6 for paving Champa-st. from Nineteenth-st. to Downing-ave. B. P. W.

Winchester, Ind.—Sealed proposals will be received until Sept. 10 for improving Main and Meridian-sts. William P. Needham, cy. clk.

St. Joseph, Mo.—Bids will be received un-

til Sept. 12 for grading the St. Joseph and De Kalb road. Theo. Steinacker, co. surv.

Toledo, O.—Sealed bids will be received until Sept. 13 for furnishing 1,225 cords of crushed hard limestone. William M. Godfrey, co. audt.

Richmond, Ind.—Bids are invited until Sept. 2 for constructing a brick walk, stone curbing, etc., in Main-st. James H. Winder, clk.

Monroe, La.—Sealed proposals will be received until Sept. 8 for 7,788 sq. yds. of brick paving on concrete. A. A. Forsythe, mayor.

New York City.—Sealed proposals will be received until Sept. 8 for furnishing paving and rubble stone. J. W. Barlow, col. engrs.

Terre Haute, Ind.—Sealed bids will be received until Sept. 5 for the construction of gravel roads in Lost Creek twp. James Soules, co. audt.

Coshocton, Pa.—Bids are asked until Sept. 10 for 21,000 sq. yds. of brick paving and 6,900 lin. ft. of curbing. F. F. Wagner, vil. clk.

Newton, Ill.—Sealed bids will be received until Sept. 3 for constructing macadamized roadways. C. E. Cook, chm. com'n. highways.

West Shoals, Ind.—Sealed proposals will be received until Aug. 8 for constructing macadam roads in Halbert twp. Horatio Harryman, co. audt.

Omaha, Neb.—Sealed proposals will be received until Sept. 2 for repaving Poppleton-ave. with asphalt, brick or stone. William Coburn, secy. B. P. W.

Keokuk, Ia.—Bids are asked until Sept. 5 for 5,761 sq. yds. of brick paving and 5,338 sq. yds. of macadam paving. G. M Walker, cy. engr.

Carthage, O.—Sealed proposals will be received until Sept. 6 for improving the Hamilton, Springfield and Carthage pike. L. Hall, vil. clk.

Rockville, Ind.—Bids are asked until Sept. 10 for improving six highways, including grading, draining, bridging and graveling. E. H. Owen, co. audt.

Alton, Ill.—Sealed proposals will be received until Sept. 7 for grading, curbing and paving sidewalks on sundry streets. Henry Brueggeman, mayor.

Lafayette, Ind.—Sealed proposals will be received until Sept. 12 for constructing cement sidewalks and improving certain alleys. Thos. W. Burt, cy. clk.

Litchfield, Conn.—Bids will be received until Sept. 5 for Telford paving on a section of road between this place and Morris. Chas. Merriman, selectman.

Glens Falls, N. Y.—Sealed proposals will be received until Sept. 5 for constructing vitrified brick paving on concrete foundation on Glen-st. W. M. Camersu, vil. clk.

Madisonville, O.—Sealed proposals will be received until Sept. 3 for macadamizing, graveling, curbing and flagging Plainville road and Station-st. Bennett Carter, vil. clk.

St. Louis, Mo.—Sealed proposals will be received until Sept. 6 for the construction of granitoid walks in Hyde Park and Benton Park. M. L. Holman, prest. pro tem B. P. I.

Cumberland, Md.—Bids are asked until Sept. 5 for furnishing vitrified paving brick, sand, curbing, crossing stone, terra cotta pipe, etc. Howard M. Fuller, clk.

Terre Haute, Ind.—Sealed proposals will be received until Sept. 6 for paving the unimproved sidewalks on Third-st. with vitrified brick. Chas. A. Goodwin, cy. clk.

Lake Forest, Ill.—Sealed bids will be received until Sept. 5 for constructing 716 lin. ft. of cement curbing and 7,800 sq. ft. of cement sidewalk. Jas. Anderson, Jr., cy. engr.

Philadelphia, Pa.—Sealed proposals will be received until Sept. 5 for furnishing at Ft. Delaware, Del., cement, broken stone, sand, etc. C. W. Raymond, lieut.-col. engrs., 1426 Arch-st.

Columbus, O.—Sealed proposals will be received until Sept. 6 for paving Fourth-ave. with macadam and paving the gutters with hard-burned brick. Jas. A. Fanning, clk. B. P. W.

Youngstown, O.—Sealed proposals will be received until Sept. 12 for paving Scott-st., between Wick and Belmont-aves., with sheet asphalt or blocks. H. W. Calvin, clk. bd. cy. comrs.

Georgetown, O.—The contract or contracts for improving the 5th, 6th and 7th sections of the Shinkle Ridge and Cedron road, in Lewis township, will be let Sept. 3. H. L. Jennings, co. audt.

Binghamton, N. Y.—Sealed proposals will be received until Sept. 6 for paving Collier-st., from Courtney to Academy, and Academy, from Collier to State, with brick. Burr W. Mosher, cy. clk.

Kansas City, Mo.—Bids will be received until Sept. 7 for curbing and guttering Benton boulevard, from Independence boulevard to Thirty-first-st., and for constructing 77,000 sq. ft. of granitoid sidewalks. Park bd.

Des Moines, Ia.—Sealed proposals will be received until Sept. 5 for paving Eleventh-st., from Forest to College-ave., 4,700 sq. yds., with brick on concrete, with Murphy grout filler. G. A. Eberhart, chrm. B. P. W.

Toledo, O.—Sealed proposals will be received until Sept. 12 for paving with vitrified blocks on concrete Knower-st., from Broadway to Maumee-ave., and with Trinidad asphalt or vitrified blocks Rockingham-st., from Fulton to Cherry. Lem. P. Harris, cy. clk.

Albany, N. Y.—Bids are asked until Sept. 5 for 11,000 sq. yds. of brick paving on Elm-st.; 6,530 lin. ft. granite curbing, 270 lin. ft. circular granite curbing, 60,000 sq. ft. new brick sidewalk, 10,000 sq. ft. 4-ft. flag sidewalk, six receiving basins. Horace Andrews, cy. engr.

CONTRACTS AWARDED.

Cleveland, O.—M. F. Bramley secured the contract Aug. 2 for paving Bridge-st. with shale brick.

Easton, Pa.—C. H. Lutzen & Sons submitted the lowest bid for macadamizing nine streets, at $47,932.

Pecatonica, Ill.—The contract for macadamizing and curbing Main-st. was awarded to Thos. Dole.

Sing Sing, N. Y.—The contract for asphalt paving has been awarded to the Hastings Pavement company at $2.25 a sq. yd.

Anaconda, Mont.—The contract for constructing twelve miles of wagon road was awarded Aug. 3 to Arnold Mickels for $2,150.

Wilmington, Del.—John Jacoby secured the contract for paving Lord-st., between Poplar and Lombard, with brick.

Decatur, Ill.—F. J. McDonald was awarded the contract Aug. 17 for graveling Franklin-st., for $2,341.

Bowling Green, O.—The contract for paving N. Grove-st. with vitrified block was awarded Aug. 9 to A. Graham for $4,732.14.

Bayonne, N. J.—The contract for improving W. 194th-st. was awarded to Rehill & Edward of Jersey City for $29,660.

South Norwalk, Conn.—The contract for brick paving on S. Main-st. has been awarded to W. R. Johnson for $10,000.

Kansas City, Mo.—Contracts for paving alleys were awarded Aug. 11 to Walter Hickman at $1.49 and $1.59 a sq. yd.

Edwardsville, Ill.—Chas. W. Heinrich secured the contract for constructing brick sidewalks in sundry streets for $466.82.

Little Falls, N. Y.—The contract for improving Ray and Loomis-sts. has been awarded to Hallinan Bros. for $14,430.

Macon, Ga.—The contract for 8,000 sq. yds. of brick paving has been awarded to W. S. Lasley of Chattanooga, Tenn., at $2 a sq. yd.

Boston, Mass.—The contract for constructing a Telford macadam roadway in Dorchester was awarded Aug. 15 to J. McGraw & Co., for $14,516.

Milwaukee, Wis.—The contract for replacing the wooden pavement on Galena-st. with macadam has been awarded to C. Froemming for $3,913.

Annapolis, Md.—The contract for paving Prince George, Bladen and Compromise-sts. was awarded Aug. 16 to Joseph Jewell for $4,500.

Phillipsburg, Pa.—The contract for paving 1¾ mis. of streets with brick was awarded to Hugh E. Crilley of Allentown for $30,000.

Ashfield, Mass.—Tuttle & Edgerly, Swampscott, Mass., were awarded the contract Aug. 11 for constructing a macadam road for $4,785.

Lunenburg, Mass.—The contract for building a macadam road was awarded Aug. 18 to C. H. Kelleher of Newburyport for $3,782.

Peterborough, Ont.—A contract for contract for constructing about 5,000 lin. ft. of sidewalk has been awarded to Dolan & Sheehey of Belleville.

Xenia, O.—The contract for constructing about 3 mis. of road has been awarded to Harry Tavener of Clifton at $1,600 a mile.

Denver, Colo.—The contract for grading, curbing and draining Logan-ave. was awarded Aug. 17 to R. J. P. O'Rourke for $19,791.11.

Springfield, Ill.—The contract for building two driveways and curbing around the Wabash depot was awarded to Welch, Patterson & Striffler.

Urbana, Ill.—The contract for paving California-st. has been awarded to J. W. Stipes of Champaign at $1.20 a sq. yd. for Clinton brick.

Warren, Mass.—The contract for building a macadam road was awarded Aug. 11 to John S. Lane & Son of Springfield for $2,822.

Paterson, N. J.—The contract for paving certain streets with asphalt was awarded Aug. 22 to the Paterson Construction Co., at $1.98 a sq. yd.

Cortland, N. Y.—The contract for paving Main-st. with Trinidad sheet asphalt was awarded to the Warren-Scharf Asphalt Paving Company for $71,592.50.

Kansas City, Kas.—The Gilsonite Roofing & Paving Co. of St. Louis, Mo., secured the contract for rock asphalt paving in this city at $2.10 a sq. yd.

Montgomery, Ala.—The Coaldale Brick and Tile company of Birmingham, Ala., has been awarded a contract for furnishing 1,350,000 brick for $25,000.

Louisville, Ky.—The Assyrian Asphalt company of Chicago was awarded contracts Aug. 10 for paving Von Borries and Hepburn-aves. with asphalt for about $21,000.

Danville, Ill.—J. H. Palmer was awarded the contract Aug. 15 for paving Walnut-st. with Danville brick and Payne-ave. and Fera's alley with Clinton brick.

Cleveland, O.—The Alcatraz Asphalt company was awarded the contract Aug. 19 for paving the Superior-st. viaduct with asphalt at $1.67 a sq. yd., or $12,600.

Kenosha, Wis.—The contract for paving Grand-ave. was awarded Aug. 16 to A. E. Rutledge & Co. of Rockford, Ill., at $1.37 a sq. yd. for Purington brick.

San Francisco, Cal.—The contract for paving Market-st., from Second to Sixth, with asphalt, has been awarded to the City Street Improvement company for $13,776.

Galveston, Tex.—The contract for resurfacing four roads on the main land with shells has been awarded to J. M. Griswold at 75 cents, $1.25, $1.75 and $2 a cu. yd.

San Francisco, Cal.—The contract for keeping the bitumenized streets in order for the next year was awarded Aug. 11 to the City Street Improvement company for $37,000.

Oswego, N. Y.—The Warren-Scharf Asphalt Paving company was awarded the contract Aug. 8 for paving W. Mohawk-st., between Fourth and Fifth-sts., with asphalt for $2,245.42.

Oakland, Cal.—The contract for improving San Leandro road has been awarded to E. B. Stone for $7,108, and for macadamizing Fruitvale-ave. to Gottlieb Schumacker for $8,000.

Fulton, N. Y.—(Special.)—O. C. Reed, cy. engr., says the contract for 800 sq. yds. of brick paving, curbing, etc., was awarded to A. S. Webb of Syracuse, N. Y., for $1,779.75.

Detroit, Mich.—James Grant was awarded a contract Aug. 3 for paving Congress-st., from Woodward-ave. to First-st., with brick at 87 cents a sq. yd. The city will furnish the brick.

Toronto, Can.—The Warren-Scharf Asphalt company secured the contract Aug. 4 for paving Spencer-ave. with asphalt for $9,790, and York-st., from Front to King, for $7,807.

Fremont, O.—Straub & Tischler of Mansfield, O., was awarded contracts Aug. 16 as follows: Paving Hayes-ave., Metropolitan block, $14,525.63; macadamizing W. Napoleon-st., $2,899.28.

Reading, Pa.—The Pennsylvania Asphalt company of Philadelphia was awarded a contract Aug. 19 for asphalt paving in this city at $1.74 a sq. yd. The city saved $14,000 by re-advertising the bids.

Indianapolis, Ind.—Contracts were awarded Aug. 22 as follows: Gravel and cement walks on Pawpaw-st., Geo. McCray, $1.74, and on Sterling-st., J. H. Roberts, $1.92; brick walks on Arizona-st., H. T. Nolting, 96 cents.

Milwaukee, Wis.—Contracts for putting in

combination cement curbing and gutters were awarded, Aug. 16, to Stamsen & Blome at 39 cts. a ft., and cement sidewalks at 67 cts. a ft.

Kewanee, Ill.—The lowest bid submitted for paving Tremont-st. with brick on a 6-in. concrete foundation was that of the Flick & Johnson Construction Co. of Davenport, Ia., for $36,157.48.

Portland, Me.—The contract for paving the Portland bridge was awarded, Aug. 15, to the Maine & New Hampshire Granite Co. for $2.136. T. F. Griffin & Bro. will furnish the material for $3,888.

Laporte, Ind.—The contract for constructing about 9,000 sq. yds. of paving was awarded to Chas. L. Kinney of Elkhart, Ind., at $1.16 a sq. yd. Metropolitan repressed block will be used.

Lafayette, Ind.—The Indiana Construction Co. of Terre Haute, Ind., has been awarded the contract for constructing 6-ft. cement sidewalks in Columbia-st., from Sixth to Main, at 49 9-10 cts.

Cedar Falls, Wis.—The contract for brick paving was awarded, Aug. 2, to J. W. Campbell of Des Moines, Ia., at 84½ cts. a sq. yd. for Des Moines brick and 32 cts a lin. ft. for cement curbing.

Beaver Falls, Pa.—The contract for paving Eleventh-st. with vitrified brick was awarded, Aug. 2, to Funkhauser & Coates and C. I. Harrold, the contract being divided equally between the two firms; total cost, $9,388.16.

Rockford, Ill.—The contract for paving E. State-st. with asphalt was awarded, Aug. 1, to the Barber Asphalt Paving Company of Chicago at $1.73 a sq. yd. The Assyrian Asphalt company presented the lowest bid, $1.64.

Bridgeport, Conn.—The lowest bid received Aug. 3 for paving with asphalt Fairfield-ave. and Main-st. was that of the Atlantic Alcatraz company of New York City, which was as follows: 5 yrs. guarantee, $2.18; 10 yrs., $2.38; 15 yrs., $2.56.

Olean, N. Y.—B. U. Taylor & Co. were awarded the contract, Aug. 12, for 2,000 sq. yds. of brick paving at $1.29 a sq. yd.; 1,270 lin. ft. 4-inch curb, 35 cts.; reset curb, 15 cts.; 4-inch circular curb, 53 cts.; drain tile, 4 cts.; total, $3,235.

Buffalo, N. Y.—The Barber Asphalt Paving company submitted the lowest bid, Aug. 15, for surfacing Ferry-st. for $14,533; L. H. Gipp, for repaving Babcock-st. with brick, at $20,000, and Henry P. Burgard with asphalt at $23,000.

Rensselaer, N. Y.—The contract for paving the approaches to the viaduct was awarded to Frank Pidgeon of Saugerties at $3 a sq. yd. for granite paving, 50 cts. a sq. ft. for bridge and crosswalk stone and $1.25 a lin. ft. for circular curbing; total, $10,584.

Belleville, Ill.—The Meyers Construction company of St. Louis was the lowest bidder, Aug. 17 for paving E. Main-st. with brick, and will probably be awarded the contract. The company's bid was $16,125 for Wabash brick and $15,435 for Evansville brick.

Rockford, Ill.—The contracts for paving S. Main-st., from the Illinois Central tracks to Morgan-st., with asphalt and brick have been awarded to the Barbar Asphalt Paving company at $1.73 a sq. yd. for the asphalt pavement complete, and to G. Maffioli at 90 cts a sq. yd. for brick.

Milwaukee, Wis.—The Warren-Scharf Asphalt Paving company was awarded the contract for paving Franklin-place and Shepard-ave. with asphalt at $1.98, and Fifth-st. at $2.24 a sq. yd. The Western Paving and Supply company secured the Newberry boulevard paving contract at $1.95.

Brooklyn, N. Y.—The lowest bid submitted for laying asphalt strips was that of T. U. Bowman, which was as follows: Asphalt, $1.95 and $1.80 a sq. yd.; concrete foundation, $4.20 a sq. yd.; block stone, 30 cts. a sq. yd.; wooden leaders, $16 per M ft.; total, $23,000.

Spokane, Wash.—The contract for paving Riverside-ave. with asphalt was awarded to the City Street Improvement company of San Francisco, Cal., at $2.38 a sq. yd. for Standard asphalt. The property-owners have asked, however, that work be suspended until April, 1899.

Rochester, N. Y.—The contract for paving E. Main-st., from Goodman-st. to the Culver road, was awarded Aug. 10 to Whitmore, Rauber & Vicinus for $56,173. Hornellsville brick will be used. The Warren-Scharf Asphalt company of New York City secured the contract for paving Clarissa-st. for $11,565.41.

Des Moines, Ia.—Contracts have been awarded as follows: Curbing Pleasant-st. and Kingman boulevard, T. O'Brien & Co., 39 9-10 and 39 9-10 cts. a lin. ft. respectively; paving number of alleys with brick, Likes Improvement company, $1.32 a sq. yd.; paving Pleasant-st. with brick, Jack Campbell.

Alexandria, Va.—Only two bids were submitted Aug. 11 for paving King-st., between Fairfax and Royal-sts., with vitrified brick. Julian C. Smith of Baltimore bid $2.19 and $2.25 a sq. yd. and Martin McManus of Washington $2.25. The bids are considered too high and action on them was deferred for a few days.

Brooklyn, N. Y.—Cranford & Co. submitted the lowest bid Aug. 2 for repairing and maintaining about fifty asphalt streets as follows: Maintaining and repairing asphalt over whole street, 13, 18 and 20 cts. a sq. yd.; new curbstone, 75 cts. a lin. ft.; new cross walks, 40 cts. a sq. ft.; restoring openings, $3 a sq. yd.

Anderson, Ind.—(Special.)—H. H. Rogers, cy, engr., says contracts for 14,000 sq. yds. of brick pavement, using Canton metropolitan block, were awarded to Charles L. Henry of this city at $1.17 a sq. yd., and for 4,000 sq. yds. to Charles H. Daniels at $1.22 a sq. yd. The foundation will be 10 ins. of gravel and 2 ins. of sand.

Indianapolis, Ind.—The Warren-Scharf Asphalt company was awarded the contract Aug. 9 for paving with asphalt the first alley east of Meridian-st., from Vermont to Michigan, at $2.08 a lin. ft. each side. The contract for creosoted wood block paving with stone curbing, on Twelfth-st., was awarded to the Hoosier Construction company at $4.33 a lin. ft.

Newark, N. J.—Asphalt paving contracts were awarded Aug. 25 as follows: Atlantic Alcatraz Asphalt company—Ninth-ave., $1.68; Broome-st. and Sidney-place, $1.65. New Jersey Asphalt company—N. Seventh, Fulton and S. Seventh-sts., $1.64; a second part of N. Seventh will be paved with brick at $1.75. Barber Asphalt Paving company—Lincoln Park, $1.52.

Omaha, Neb.—The lowest bids received July 29 for paving and curbing were as follows: Thirty-second-st., from Davenport to Farnam, asphalt, J. B. Smith, $1.39 a sq. yd.; Dodge-st., from Thirty-first-ave. to

Thirty-fourth-st., Grant Paving company, $1.37; curbing the same district, J. B. Smith, 53 cts. for asphaltum sandstone, and 55 cts. for Colorado sandstone.

Kansas City, Mo.—The Barber Asphalt Paving company has been awarded contracts amounting to $57,910. Other paving contracts awarded are: Garfield-ave., asphalt, Gilsonite Paving company, $2.10; Central-st., brick, $1.44⅝, and Washington, $1.48, Matt Kinlen; Holly-st., brick, Parker-Washington company, $1.49; alley, A. P. Morse, $1.53; alley, Walter Hickman, $1.59.

Syracuse, N. Y.—Paving contracts were awarded the latter part of July as follows: Park-ave., from Northwest-st. to Barker-ave., Trinidad asphalt, Columbia Construction company, $9,256.60; Barker and Matty-aves. and Wilkinson and Tracy-sts., Asphaltina. Asphaltina Construction company, $21,676.80; Park-ave., from Barker-ave. to Geddes-st., Alcatraz asphalt, Empire Contracting company, $40,628.90.

New Orleans, La.—Bids were received Aug. 8 for paving with asphalt Canal, Claiborne and Camp-sts. The Ayres Asphalt company of Zanesville, O., was the lowest bidder on Camp-st., at $2.52 a sq. yd.; the French Asphalt company on Claiborne-st., at $2.43 a sq. yd.; Belden & Seely, representing the Columbia Construction company, on Canal-st., at $2.65 on 6-in. concrete, $2.49 on 4-in. concrete, and $2.28 on square block.

Toledo, O.—The contract for macadamizing Bancroft-st. was awarded Aug. 18 to Contractor Ryan for $5,844.20. The contract for the work was awarded some time ago to G. H. Bodette, but he refused to keep the macadam road in repair for five years. Schillinger Bros. submitted the lowest bid Aug. 20 for constructing 19,000 ft. of asphalt walk around the court house park at $1.15 a lin. ft.

Meadville, Pa.—Peter Schenck of Butler, Pa., was awarded the contract for paving with Park fire clay brick, wire-cut and Meadville sandstone, as follows: Paving, $1.25 a sq. yd.; flagging, natural or sandstone and curbing, 40 cts. a ft.; edge stone, 33 and 25 cts.; cast iron gutter plates, 1¾ cts. a lb.; two standard catch basins, $30 each; 12-in. storm sewer, 40 cts. a ft.; 10-in. sewer, 35 cts. each; total, $4,958.

Peoria, Ill.—The contract for paving Dechman-ave. with asphalt was awarded Aug. 15 to the Assyrian Asphalt company of Chicago at the following prices: Asphalt, $1.54 a sq. yd.; excavation, 15 cts.; setting protection curb, 25 cts.; combination curb and gutter, 52 cts. The Warren-Scharf Asphalt company bid $1.79. The contract for grading 85 rods of the Galena road was awarded Aug. 16 to the Crescent Stone company at $7.39 a lin. rod.

Cincinnati, O.—The Southwestern Alcatraz Asphalt Paving and Construction company was awarded the contract Aug. 4 for paving Bates-ave., from Colerain to Spring Grove-ave., 2,735 sq. yds., with Alcatraz asphalt, at $1.67 a sq. yd.; curb, 88 cts. a lin. ft.; re-setting curbs, 5 cts.; grading, 25 cts. a cu. yd.; repaving 50 cts. a sq. yd.; total, $7,791. M. T. Flynn secured the contract Aug. 2 for improving Western-ave. for $14,386.

Newark, N. J.—Asphalt paving contracts were awarded Aug. 4 to the Newark Paving & Construction company as follows: Elm-st., $1.51; Livingston-st., $1.55; Charlton-st., $1.57 a sq. yd. The Atlantic Alcatraz company was the lowest bidder on Garside-st., at $1.65 a sq. yd., but the awarding of the contract was deferred to enable Engineer Adam to ascertain whether the company had conformed to the specifications in submitting samples of material. The contract for paving Pacific-st. with granite was awarded to James F. Shanley at $1.54 a sq. yd.

Brooklyn, N. Y.—Bids were received Aug. 16 for laying asphalt strips from Thirty-fourth-st and Astoria ferries in Long Island City, to connect with the good roads in Queens Landing out on Long Island, as follows: The Warren-Scharf company bid $1.85 and $1.80 a sq. yd. for asphalt; concrete foundation, $4.50 and $4.25; stone block foundation, 38 and 35 cts. a sq. yd.; wooden leaders, 1,000 ft., $22. Barber Asphalt Paving company—Asphalt, $1.78 and $1.84; concrete, $4.50; stone block, 35 cts., and wooden leaders, $22. Atlantic Alcatraz Asphalt company—Asphalt, $1.96 and $1.98; concrete, $4.44; stone block, 38 cts., and wooden leaders, $22. T. U. Bowman—Asphalt, $1.95 and $1.80; concrete, $4.20; stone block, 30 cts., and wooden leaders, $16.

SEWERS.

Riverside, Cal.—The city engineer has compiled a book of sewers and sewer connections, which shows that the city has more than 9½ mls. of sanitary sewer, which have cost $42,009.70. The first sewer was laid in 1887.

Cohoes, N. Y.—The public improvement commission engaged Prof. Palmer C. Ricketts of Troy, N. Y., to consider the plans for a sewerage system, for which bids were received in July. He recommends the plan signed I. X. L., for by it most of the present sewers can be used.

Toronto, Ont.—Dr. Sheard, medical health officer, visited the United States recently to obtain information on sewage disposal. He was most favorably disposed with the methods in use in Worcester and Brockton, Mass. In Worcester the sewage is treated by precipitation, and in Brockton by filtration.

A delegation of the city government of Montreal, Canada, consisting of Alderman D. Gallery, A. Eckers, R. Turner, P. G. Martineau, H. Dupins, E. Preneveau, Pierre Wilson, Leon Ounnet, city surveyor; P. C. St. John, and A. Bassette, secretary of the road department, have been examining sewerage systems in the United States.

Rochester, N. Y.—The common council has appointed Gaylord Thompson, M. Am. Soc. C. E., as expert engineer to assist the city assessors in the preparation of the assessment for the East Side trunk sewer, which was designed by Emil Kuichling, M. Am. Soc. C. E., about ten years ago. The sewer was built by aspecial commission created for that purpose, and cost nearly $1,000,000. This amount, with a cumulated interest, has now to be assessed upon the territory benefited.

Sewers—Contracts to Be Let.

Billings, Mont.—Bids will be received until Sept. 6 for constructing a sewerage system. Cy. clk.

Trenton, N. J.—Bids are asked until Sept. 6 for constructing sewers. C. E. Murphy, cy. clk.

Santa Ana, Cal.—Bids will be received until Sept. 15 for constructing the outfall sewer. Bd. trustees.

Dunkirk, N. Y.—Bids are asked until Sept. 6 for building a tile sewer. Wm. C. Baumgarten, cy. clk.

Mansfield, O.—Bids will be received until Sept. 17 for building a storm water sewer. F. M. Remy, cy. clk.

Willmar, Minn.—Bids will be received until Sept. 10 for constructing ditch No. 8. Lewis Johnson, co. audt.

Le Sueur, Minn.—Bids will be received until Sept. 10 for constructing ditch No. 12. Jos. Rachac, co. audt.

Henderson, Ky.—Bids will be received until Sept. 6 for building a sewer or culvert. W. I. Thompson, mayor.

Pocomoke City, Md.—Bids are asked until Sept. 7 for constructing a sewerage system. R. M. Stevenson, mayor.

Lafayette, Ind.—Bids are asked until Sept. 12 for street improvements and sewers. Thos. W. Burt, cy. clk.

Richmond, Ind.—Bids will be received until Sept. 2 for building a storm water sewer. Jos. H. Winder, cy. clk.

Cleveland, O.—Bids are asked until Sept. 8 and Sept. 15 for constructing sewers. Geo. R. Warden, dir. pub. wks.

Richmond, Ind.—Bids will be received until Sept. 16 for the construction of a trunk sewer. J. H. Winder, clk. B. P. I.

Tiffin, O.—Bids are wanted until Sept. 5 for changing the main sewer in the Fourth ward. J. B. Ehrenfried, cy. clk.

Kearney, N. J.—Bids are asked until Sept. 13 for constructing 5,200 lin. ft. of brick sewer. Jas. F. Kelly, twp. clk.

Fairbault, Minn.—Bids will be received until Sept. 12 for constructing sewers, with manholes, etc. P. F. Ruge, mayor.

Racine, Wis.—Bids are asked until Sept. 3 for 2,100 ft. of brick and 3,000 ft. of pipe sewer. O. Burlingame, cy. engr.

Shelby, O.—Bids are asked until Sept. 19 for constructing about 6 miles of lateral sewers. W. F. Sonnantine, clk. sewer com'n.

Davenport, Ia.—Bids will be received until Sept. 7 for building a sewer on Le Claire-st. E. W. Boynton, comr. pub. wks.

South Bend, Ind.—Sealed proposals will be received until Sept. 12 for constructing a pipe sewer on N. Michigan-st. L. A. Hill, cy. clk.

Mansfield, O.—Sealed proposals will be received until Sept. 10 for constructing a 10-in. lateral sewer on Marion and Wise-aves. F. M. Remy, cy. clk.

Columbus, O.—Sealed proposals will be received until Sept. 6 for building sewers in sub-sewer dist. I of main sewer dist. 1. Jas. A. Fanning, clk. B. P. W.

Buffalo, N. Y.—Sealed proposals will be received until Sept. 2 for building brick sewers in Hampshire and Ferry-sts. and a tile sewer in Kenmore-ave. R. G. Parsons.

Callender, Ia.—Sealed proposals will be received until Sept. 5 for constructing sewers. Also, for furnishing No. 1 sewer drain tile. N. C. Rasmussen, chrmn. sewer com.

Waukesha, Wis.—Sealed proposals will be received until Sept. 2 for constructing a pipe sewer in Hartwell-ave., from Broadway to College-ave., 1,698 feet. John P. Dey, prest. B. P. W.

Boston, Mass.—Bids are asked until Sept. 3 for furnishing pumping engines, etc., for an addition to the sewage pumping plant at North Somerville. Wm. M. Brown, jr., ch. engr. Met. Sewerage Com'n.

Havana, Ill.—Sealed proposals will be received until Sept. 3 for constructing a submerged cast iron pipe, intercepting chamber with manhole, 320 ft. 4-ft. brick sewer and 3 catch-basins. H. C. Breidert, cy. engr.

Hammond, Ind.—Sealed proposals will be received until Sept. 8 for constructing a main brick sewer in the village of West Hammond, consisting of the following: 860 ft. 2-ring 3½ ft. sewer; 1,290 ft. 2-ring 4-ft. sewer; 250 ft. 3-ring 4-ft. sewer, with manholes, catchbasins and appurtenances. Martin H. Finneran, vil. clk.

CONTRACTS AWARDED.

McKee's Rocks, Pa.—E. F. Hughes was awarded sewer contracts Aug. 16 for $5,000.

Reading, Pa.—Frank P. Hawman secured the contract for a storm water sewer for $9,492.68.

Bayonne, N. J.—Martin Murray secured the contract for constructing a new sewer for $17,200.

Bellevue, Pa.—The contract for building the sewerage system was awarded to Harvey Sloan for $58,000.

Springfield, Mass.—The contract for sewer was awarded to Clapp & Shipman of New York for $25,625.

Anaconda, Mont.—The contract for building sewers in dists. 7, 8, 10 and 11 have been awarded to Patrick Walsh for $4,636.

Manitowoc, Wis.—The contract for building 300 feet of brick sewer has been awarded to Arnold Van Gemert for $1,500.

Decatur, Ill.—A. F. Gebhart secured the contract for constructing a lateral sewer at 30½ cts. a lin. ft.

Aurora, Ind.—The contract for constructing a sewer in Second-st. was awarded Aug. 3 to Richard Block for $3,247.

Alton, Ill.—The contract for the extension of the Front-st. sewer was awarded Aug. 22 to Chas. Dagenhart at $2.75 a lin. yd.

Syracuse, N. Y.—The contract for building a trunk sewer in Midland-ave. has been awarded to John W. Bustin for $50,000.

Milwaukee, Wis.—The contract for building the Thirtieth-st. tunnel sewer was awarded to Geo. E. Zimmerman for $24,993.50.

Annapolis, Md.—The contract for building a sewer in West and Calvert-st. was awarded Aug 8 to D. V. Bright for $2,224.22.

Rockford, Ill.—The contract for building 1,360 feet of 9-in. sewer was awarded Aug. 20 to Thos. Tole at 29½ cts. a ft.

Bridgeport, Conn.—The contract for constructing a sewer in Harral-ave. was awarded Aug. 19 to the Pierce Manufacturing company at $1.79 a lin. ft.

Kansas City, Mo.—The contract for building brick and pipe sewers in district No. 175 was awarded, Aug. 11. to M. Walsh for $13,800.

Highland Park, Mich.—The contract for building sewers, the outlet to be into the Detroit system, has been awarded to James Hanley, of Detroit, for $51,850.

Reading, Pa.—The board of public works has recommended that the contract for building the house sewer in the ninth district be awarded to Samuel W. Frescoln for $41,878.

Boston, Mass.—Bids were received Aug.

18 for building brick and pipe surface drains in Dorchester as follows: T. H. Connolly, $8,531; J. P. O'Connell, $10,501; Collins & Ham, $11,358; T. H. & G. W. Byrne, $12,117; J. J. Falvey, $12,317; D. E. Lynch, $12,933; Jones & Meehan, $13,570; H. P. Nawn, $14,457.

Mendota, Ill.—Bids were received Aug. 15 for constructing the sewer outlet as follows: Sewer extension—Israel Doan, $3,991; N. E. Stucker, $2,547. Filtration bed—Law & Barber, city, $15,797; Israel Doan, Aurora, $15,501; H. D. Hallett, Mattoon, $15,012; J. H. Roach, $14,559; P. H. Mahoney, Omaha, $11,066; Berry & Welsh, $8,486. The contract has not been awarded. Charles P. Chase of the Iowa Engineering company will superintend the work.

Kewanee, Ill.—The contract for the extension of the northwest sewer was awarded, Aug. 23, to Mason, Lindburg & Skoog, city, for $734.30. The contract for the sewage disposal tanks was let as follows: Substructure, laying pipe, excavating, filling and one distributing main, Stamsen & Blome, Chicago, $985.40; superstructure, John McCullough, city, $418; gasoline engine, boiler and 6-inch centrifugal pump, H. A. Dustin, city, $766.79.

CONTEMPLATED WORK.

Bessemer, Col.—Plans for a sewerage system have been adopted.

Pittsburg, Pa.—Sewers will be constructed in several streets.

Denton, Tex.—Action is being taken toward securing a sewerage system.

Taunton, Mass.—An appropriation of $16,000 has been voted for sewers.

Ripley, O.—The question of building a sewerage system is being agitated.

Philadelphia, Pa.—The 3-ft. brick sewer in Chestnut-st. will be enlarged.

Springfield, Mass.—The construction of a sewer in Worthington-st. is contemplated.

Elkhart, Ind.—The city council has decided to construct a sewer in Middlebury-st.

Oswego, N. Y.—Plans will probably be prepared for a sewer in E. Bridge-st. Cy. engr.

Everett, Mass.—The council has appropriated $10,000 for a sewer in Hendersonville.

Kokomo, Ind.—The construction of a 4-ft. brick sewer in Union-st. is contemplated.

St. Louis, Mo.—The wooden bottom of the Mill Creek sewer will be replaced with concrete.

Oakmont, Pa.—This borough voted Aug. 16 to issue bonds to construct a sewerage system.

New Britain, Conn.—The question of sewage disposal is being considered. M. O. Webster, mayor.

Jackson, Mich.—The construction of a sewer in Union-st. in the near future is contemplated.

Quincy, Ill.—Ordinances were adopted by the city council Aug. 17 for constructing six sewers.

Woodbridge, N. J.—The question of building sewers in four streets will be voted on Sept. 20.

Carlisle, Pa.—The construction of a brick sewer is contemplated at a cost of $8,000. St. Com.

Sheraden, Pa.—The citizens voted Aug. 15 to issue $30,000 for paving and sewer construction.

Rockford, Ill.—About 5,000 ft. of pipe sewer have been ordered constructed. Edwin Main, cy. engr.

Philipsburg, N. J.—About 1¼ miles of sewer extensions are contemplated. James E. Smith, cy. engr.

Owosso, Mich.—A mile of 24 to 8-in. pipe sewer will be constructed; estimated cost, $5,500.

Little Falls, N. Y.—Sewers will be constructed in three streets at a cost of $20,000. Mayor Dasey.

Cloquet, Minn.—The construction of a sewer in Arch-st., from B to C-aves., is proposed.

Madison, Wis.—The city engineer's plans for a storm water sewer in N. Hamilton-st. have been filed.

Montclair, N. J.—The council acted favorably upon a petition for a sewer in Fulton-st. Aug. 22.

Mansfield, Pa.—The construction of 15 to 10-in. pipe sewers for the proposed system is contemplated.

Richmond, Va.—Bids will probably be asked about the middle of September for constructing certain sewers.

Sherman, Tex.—The question of sewerage construction will be considered the first Monday in September.

Belvidere, Ill.—An ordinance was passed Aug. 15 providing for the construction of a branch sewer in N. State-st.

Philadelphia, Pa.—The citizens in the Seventeenth, Eighteenth and Twentieth wards are agitating the question of building sewers.

Oakland, Cal.—City Engineer Clements has been instructed to prepare plans for extensive sewer improvements.

East Hartford, Conn.—Sewers will probably be constructed in the East Hartford and Meadow districts. J. O. Goodwin, town clk.

Hamilton, O.—Plans and specifications for a sewer in Market-st. are being made by Civil Engineer Marble of Columbus, O.

Columbia, Mo.—The report of the sewer commission contemplates 5 1-6 miles of sewers at a cost, complete, of $25,000.

Hempstead, L. I.—The question of constructing a sewerage system is being considered. Henry L. Nichols, vil. prest.

Altoona, Pa.—Ordinances have been passed for constructing sewers in Second-ave. and Fifth-st., and in three alleys.

Cincinnati, O.—The contract for sewers in Camp Washington will be let in about three months. I. B. Punshon, cy. engr.

Waycross, Ga.—Surveys for the construction of a sewerage system are being made by W. H. Chapman, C. E., of New York City.

Everett, Mass.—An appropriation of $10,000 for constructing trunk sewers and connections in Hendersonville is reported.

Findlay, O.—A resolution has been passed to construct a sewer in Frazier-st., from Morey-ave. to Cory-st. A. W. Ray, cy. clk.

Newark, N. J.—Plans for the Clinton Hill sewer were submitted to the board of works by Engineer Adam Aug. 4 and accepted.

Niles, O.—A resolution has been passed declaring it necessary to build a sewer on Robbins-ave., from Summit-ave. to Mosquito creek.

East Hartford, Conn.—The question of building sewers in the business portion of the city is being considered by the Meadow Fire district.

Hazleton, Pa.—The city engineer has been authorized to receive proposals for the con-

struction of ten trapped inlets with catch-basins, etc.

Gettysburg, Pa.—The sewerage system is in need of repairs, and probably a new system will be constructed. J. L. Kendlehart, secy. town com.

Laurium, Mich.—Plans for a sewerage system are being prepared and bids will probably be asked in December or January. Jos. R. Murphy, vil. clk.

Granite City, Mo.—Engineers have been employed to make surveys for the proposed chain of sewers connecting this city, Newport, Madison and Venice.

South Norwalk, Conn.—A 24-in. overflow storm sewer will be constructed to relieve the sewers in the lower portion of the city. Jos. R. Taylor, cy. clk.

Newark, N. J.—Ordinances have been ordered to third reading for the construction of sewers in about 30 streets. Wm. E. Greathead, clk. bd. st. & water comrs.

Princeton, Ill.—The sewerage plans prepared by Alvord & Shields of Chicago have been accepted; estimated cost, $70,000. A. E. Vaughn, cy. clk.

Sycamore, Ill.—This city has decided upon the separate system. Alvord & Shields, Chicago, will prepare plans and superintend the construction of the main outlet.

Bushnell, Ill.—Aldermen Wierather, Wheeler and Throckmorten have been appointed a committee to make the preliminary arrangements for constructing a sewerage system.

Jackson, La.—Maps and estimates of a sewerage system have been prepared by W. G. Kirkpatrick of Nashville, Tenn., and the question will soon be submitted to vote.

Rat Portage, Ont.—C. W. Belyea, R. E. Dowsett and the mayor have been appointed a committee to investigate the feasibility of constructing a sewerage system.

Brookfield, Mo.—(Special.)—D. T. Howard, cy. clk., says that the proposition of issuing $14,000 of 6 per cent. bonds for the construction of a main sewer will be voted on Sept. 5.

Denver, Col.—Plans and estimates for about 2,000 acres of storm sewerage are being prepared, according to report, the plans to be completed during September. H. C. Lowrie, engr. B. P. W.

Mobile, Ala.—The general council met Aug. 23 to consider sewerage plans, but the commission asked for ten days' further time to consider and submit estimates of the cost of construction.

Independence, Mo.—Plans and estimates for a sewerage system were submitted by Andrew Rosewater, C. E., of Omaha, Neb., Aug. 13. An election will probably be called to vote on issuing bonds.

Elmhurst, Ill.—(Special.)—A sewer, 12 in. in diameter, 640 ft. long, with manholes and four catch basins will be built soon in Maple-ave., between Second and Third-sts. G. I. Herrick, engr., Wheaton, Ill.

Marlboro, Mass.—The construction of additional underdrains and intercepting drains at the filter beds, with 9,000 ft. of iron main sewers, with collecting well and pumps, is contemplated. The work will be done by city labor. Jas. N. Bigelow, cy. engr.

Newark, N. J.—An ordinance has been passed to construct a pipe sewer in Lexington-st. Notice of intention has been published to construct pipe sewers, to connect with the East Branch intercepting sewer in Backus-st. and Elm road, Gotthart, Garrison, Houston, Napoleon and other streets and avenues. Michael F. McLaughlin, genl. supt. wks.

WATER-WORKS.

Dubuque, Ia.—Notice has been served on the water company of the city's intention to purchase the plant.

Duluth, Minn.—The plant of the Duluth Gas and Water company was transferred, July 31, to the city of Duluth.

Lancaster, Pa.—A chemical analysis of the city water develops the fact that typhoid fever germs exist in it. The introduction of a filter and aeration pump is suggested.

Auburn, Me.—The water commissioners appointed a committee recently, consisting of E. S. Paul, A. M. Pulsifer and R. M. Mason, to investigate and report regarding the matter of keeping the water pure in Lake Auburn.

Sedalia, Mo.—The Sedalia Water and Light company, sold, Aug. 13, to R. C. Warren of New Haven, Conn., E. Burr, jr., and H. M. Knapp of Bridgeport, Conn., L. P. Andrews, Geo. E. Dugan, Chas. C. Evans and O. A. Crandall of Sedalia, the water works, for $400,000.

Redlands, Cal.—The Redlands Water company has appointed a committee consisting of Dr. M. M. Hooten, Dr. Smith, Prof. T. E. N. Eaton, C. E. Lienau and Harry Clark, to investigate the proposition made by the Mentone Irrigation company to sell them tunnel water rights and right of way to this city.

An order, directing the authorities of the city of New York to show cause why it should not be enjoined from drawing off the fresh water streams which flow into Bellmore, Freeport, Millburn, Seaford and East Rockaway creeks, in the town of Hempstead, was granted by Supreme Court Justice Smith, Aug. 1. The order was made returnable Aug. 9.

Columbus, O.—The report on the proposed storage dam and reservoir for the water works system has been submitted by Jas Schuyler, M. Am. Soc. C. E., of Los Angeles, Cal. He recommends that the concrete dam be 52 ft. high and that a spillway be provided. Also, that the curvature of the dam be increased by diminishing the radius from 1,910 to 800 ft. or less.

Buffalo, N. Y.—The reduction of the water rates is alleged to have caused a shortage in the water department of about $65,000. Under the estimates submitted by the Bureau of Water for the last fiscal year, the city was called upon to appropriate $700,000. This estimate was based on the calculation of the superintendent of water that the receipts from the water rates of his department for he fiscal year would be $700,000. After the appropriation was made the ordinances were so amended that he water rates were reduced, which affected the rates for the last six months of the last fiscal year, thus causing a shortage.

CONTRACTS TO BE LET.

Birmingham, England.—Bids are asked until Sept. 13 for building two lines of cast iron pipe and two lines of steel pipe, aggregating 17¼ miles. Edward Orford Smith, town clk.

McComb City, Pa.—Bids are asked until Sept. 21 for constructing water works. Mayor.

Bristol, Va.—Bids are asked until Sept. 21 for water works. J. D. Mitchell, chrmn. com.

Maynard, Minn.—Bids are asked until Sept. 5 for building water works. K. H. Holian, vil. rec.

Tyndall, S. D.—Bids will be received until Sept. 6 for laying water mains. James Sharon, co. audt.

Cumberland, Md.—Bids are asked until Sept. 5 for 5,500 ft. of pipe, valves, etc. H. M. Fuller, clk.

Lanesboro, Minn.—Bids will be received until Sept. 5 for building a water works system. O. M. Habberstad, vil. clk.

Pocomoke City, Md.—Bids will be received until Sept. 7 for constructing a water works system. R. M. Stevenson, mayor.

Anaconda, Mont.—Bids will be received until Sept. 5 for furnishing water for this city for five years. T. O'Leary, cy. clk.

Walker, Minn.—Sealed proposals will be received until Sept. 6 for building a water works system. Charles Kinkele, prest. vil. com.

Reedsburg, Wis.—Bids will be received until Sept. 2 for furnishing an 80 h. p. single cylinder Corliss engine, line shafting, belt, etc. Cy. clk.

Columbus, O.—Bids are wanted until Sept. 10 for the foundation and lower portion of the concrete masonry dam. James A. Fanning, clk. B. P. W.

Winnipeg, Man.—Bids invited until Sept. 6 for wells and pumping plant will not be opened owing to arrangements not being completed. C. W. Brown, cy. clk.

CONTEMPLATED WORK.

Farmington, Utah.—Plans are being prepared for water works. E. A. Vail.

Whittier, Cal.—The question of a better water supply is being considered by the city council.

Atlanta, Ga.—The question of issuing $200,000 extension bonds will be voted on Oct. 5.

Buffalo, N. Y.—The citizens of Kenmore have asked this city to supply them with water.

Fulton, Ill.—The city council contemplates building another reservoir near the artesian well.

Lebanon, Pa.—Ordinances have been passed for the extension of water mains. George W. Hayes, cy. engr.

Charlotte, N. Y.—Plans are being prepared for a water works and electric light plant. P. M. Schwartz, cy. clk.

Niagara Falls, N. Y.—An extension of 7,700 ft. of 12 and 10-in. mains is contemplated. Walter Jones, cy. engr.

Philadelphia, Pa.—Bids will be received for the West Philadelphia reservoir, by Director Thompson.

Sardis, Miss.—Plans are being prepared by Alber & Byrne of Birmingham, Ala., for the construction of water works.

Wamega, Kas.—Plans and specifications will be prepared for the proposed water works by H. V. Hinckley of Topeka, Kas.

Florence, Colo.—Hiram Phillips, C. E., St. Louis, Mo., has been engaged to prepare plans for the water works.

Centralia, Ill.—The city council is considering some plan for providing for a permanent and reliable water supply.

Medford, Ore.—A committee has been appointed to consider the matter of building a reservoir and enlarging the water works.

Clarksville, Ind.—The aldermen are reported as making arrangements for putting in a filtration plant and to improve the works.

McDonald, Pa.—The McDonald Water company has plans for the construction of a large reservoir to supply this borough with 2,000,000 gals. of water daily.

Monmouth, Ill.—The city council instructed the water works committee, Aug. 9, to purchase land for the purpose of re-locating the water works plant.

Baltimore, Md.—The council committee on health has adopted an ordinance providing for the establishment of a filtration plant for the Lake Roland supply.

Alton, Ill.—A proposition has been submitted to the council by the Seckner Contracting company to furnish plans and specifications for works and for the construction of the same.

Sausalito, Cal.—The scarcity of the water supply has led to the employment of N. M. O'Shaughnessy, C. E., of San Francisco to report on the best method for furnishing an adequate supply.

Rome, Ga.—This city contemplates constructing the clarifying system with its own men. The plans provide for a system of settling basins, with or without a gravity or sand filter. H. M. Smith, cy. engr.

Mt. Gilead, O.—A detailed report of the estimated cost of building a combined water works and electric system has been received from B. J. Ashley of Chicago, who places the cost at $26,800.

The question of issuing bonds for constructing water works will be voted as follows: Shawnee, Okla., McConnellsville, O.; Sept. 19; Gallatin, Tenn., Sept. 24; Arlington, Ga.; Tehamah, Neb.; New Richmond, O., Sept. 6.

The question of constructing water works is being agitated at the following places: Shawnee, Okla.; Berea, O.; Copenhagen, N. Y.; Coalville, Utah; Girard, O.; Mt. Sterling, Ky.; Hammonton, N. J.; Beloit, Wis.; Luray, Va.; Manti, Utah; Atwood, Ont.

St. Joseph, Mo.—This city is ready to contract for the construction of the proposed new works. They will include two low-service pumps, 8,000,000 gals. each; three high-pressure pumps, 5, 8 and 10,000,000 gals. each; standpipe, three settling basins, filter, etc. J. R. Rackliffe, cy. engr.

Fulton, N. Y.—(Special.)—O. C. Breed, cy. engr., says the proposed construction of a new system of water works has been postponed for the present owing to the water commission having agreed to arbitrate, subject to the approval of the taxpayers, for the acquisition of the present system.

The construction of water works systems is contemplated at the following places: Richfield, Utah; Whitesboro, N. Y.; Wichita Falls, Tex.; Kewanee, Ind.; Columbus, Pa.; Moultrie, Ga.; Greenup, Ill.; Clare, Ia.; Dickson, Tenn.; Fossil, Ore.; Highbridge, N. J.; Flemington, N. J.; Whittiers, Cal.; Stent, Cal.

The question of constructing water works has been favorably voted on as follows: Eaton Rapids, Mich.; Lake Odessa, Mich.; Earling, Ia.; Galesville, Wis.; Otsego, Ia.; Wasco, Ore.; Arkansas City, Kas.; Kirkville, Mo.; Perham, Minn.; Webster Groves, Mo.;

Prescott, Ont.; Harrisville, Pa.; Greensboro, Ga.; Walnut Grove, Minn.

CONTRACTS AWARDED.

Caldwell, N. J.—The Caldwell Water company has asked the borough council for a franchise to establish works.

Flagstaff, Ariz.—The contract for constructing the water works system has been awarded to George Sturtevant, jr., for $85,000.

Cattaraugus, N. Y.—The contract for extending the water works system was awarded to W. B. Wilson of Buffalo for $7,000.

Derfield, N. Y.—The town board has accepted a proposition of the West Canada Creek Water company to supply water for this place.

East Chicago, Ind.—The Seckner Contracting company, Chicago, secured the contract for extending the water works for $36,360.

Oxford Junction, Ia.—The contract for constructing water works was awarded Aug. 4 to Otto P. Hanson of this city for $3,750.

Salem, N. J.—The contract for building a filtration plant of 500,000 gals. was awarded to Joseph H. and C. J. Young of Philadelphia.

Bessemer, Ala.—The contract for increasing the water supply, enlarging the reservoirs, etc., was let to Henry F. De Bardeleben for $5,000.

Churubusco, Ind.—The contract for building the water works and electric light plant was awarded to the Seckner Contracting company of Chicago for $18,500.

New Paynesville, Minn.—The contract for building an electric light and water works plant was awarded to W. I. Gray & Co. of Minneapolis for $8,506.

Elberton, Ga.—An election has been called for Sept. 20 to determine whether or not this city shall enter into a contract with George J. Baldwin for the erection of a water works system.

Kaukauna, Wis.—The contract for building the water works system for the Kaukauna Water Works company was awarded to C. W. Weeks & Co. of Chicago and Luther Lindauer, Kaukauna, for $75,000.

Albany, N. Y.—The contract for building the pumping station at the filtration plant was awarded to Stone & Thurston of New York City at the following prices: Cast iron intake, $3,800; pumping station, $12,167; chimney stack, $1,540; sluice gates and screens, $825; 600 cu. yds., shallow exc. 50 cts.; 700 cu. yds. concrete, (1-3-6), $4.95; 100 cu. yds. concrete, (1-2-4), $6; 100 sq. yds. paving, $1; total, $22,977.

Jersey City, N. J.—Only one bid was received Aug. 18 for furnishing the new water supply, and that was from Patrick H. Flynn of Brooklyn. His bid was based on three plans: 1—Source of supply, Rockaway river, at Old Bloonton with one reservoir, from $36 per million for 25,000,000 gals. per day to $20 per million gals. for 70,000,000 gals. daily; completed works, $7,595,000 for 50,000,000 gal. pipe line, or $8,745,000 for a 70,000,000 gal. pipe line. 2—This plan is the same except that it contemplates three reservoirs, the water to be furnished by gravity at a pressure of 210 feet above mean tide. The third bid was informal and was not considered.

STREET LIGHTING.

Oakland, Md.—A municipal electric light plant is contemplated.

Lansdowne, Pa.—Bids are asked until Sept. 2 for street lighting.

Springville, Ia.—Arrangements are being made to establish an electric light plant.

Tallahassee, Fla.—The establishment of an electric light plant is contemplated.

Lonerock, Wis.—The question of establishing an electric light plant is being discussed.

Delaware, O.—Bids are asked until Sept. 3 for lighting with electricity or gas. E. E. Naylor, cy. clk.

New Richmond, O.—The question of issuing bonds for an electric light plant will be voted on Sept. 5.

Chicago, Ill.—Plans are being prepared by the city engineer for electric lights in the new pumping stations.

Anaconda, Mont.—Bids are asked until Sept. 5 for furnishing arc lights for street lighting. T. O'Leary, cy. clk.

Watertown, N. Y.—The question of municipal lighting is being investigated. C. C. McComb, cy engr.

Havelock, Neb.—Plans are being considered for an electric light plant, according to press reports.

Fredericksburg, Va.—The city council is considering the question of erecting a municipal electric light plant.

Evansville, Ind.—Mayor Aiken has, according to press reports, agreed to levy a tax for a municipal electric light plant.

Trappe, Md.—The construction of an electric light plant is contemplated. S. Chaplain, prest. bd. town comrs.

Decatur, Mich.—Sealed proposals will be received until Sept. 6 for constructing an electric light plant. E. J. Rawson, clk.

Chicago, Ill.—The Jefferson Electric Light Co. has been incorporated by M. A. Fort, Harry Ferguson and Wm. M. Copeland.

Winchester, Va.—Bids will be received until Sept. 15 for constructing an electric light plant. Henry Schneider, chrm. light com.

BRIDGES.

Armour, S. D.—Bids will be received until Sept. 5 for building a bridge. Co. aud.

Elberton, Ga.—The county commissioners contemplate building bridges across Broad river.

Unionville, Mo.—Bids are asked until Sept. 6 for three bridges. Chas. E. Bailey, br. comr.

Paterson, N. J.—Plans will be prepared for constructing a new bridge at Main-st. Bd. freeholders.

Oshkosh, Wis.—Bids are asked until Sept. 6 for constructing a bridge across Sawyer creek. B. P. W.

Oroville, Cal.—Bids are asked until Sept. 7 for building a bridge over Powell creek. Bd. supervisors.

Rose, N. Y.—This town has decided to build a new iron bridge over the Adams canal at Glenmark.

Wichita, Kas.—Bids are asked until Sept. 10 for constructing three steel bridges. A. M. Denny, co. clk.

Omaha, Neb.—The county clerk has been instructed to ask for bids for a steel bridge over the Elkhorn river.

Pendleton, Ore.—Bids will be received until Sept. 7 for building two bridges. B. G. Burroughs, cy. clk.

Newport News, Va.—Bids are asked until Sept. 16 for bridges across C. & O. R. R. J. A. Massie, cy. clk.

Colusa, Cal.—Bids are asked until Sept. 6 for building a bridge on Princeton rd. Geo. K. Ford, clk. bd.

Brainerd, Minn.—Sealed bids will be received until Sept. 9 for building a steel bridge. F. A. Farrar, cy. clk.

Minneapolis, Minn.—The erection of an iron bridge across Straight river is contemplated by the council.

Natchitoches, La.—Bids will be received until Sept. 15 for an iron bridge over Johnson Chute. Geo. W. Kile.

Lorain, O.—Plans and specifications will be prepared for a new bridge at Erie-ave. by F. C. Osborn, C. E. of Cleveland.

Columbus, O.—Bids will be received until Sept. 13 for repairing and rebuilding a bridge. W. H. Halliday, co. audt.

Westfield, Mass.—The construction of an iron or steel bridge over Little river has been decided upon. Co. comrs.

Lima, O.—Bids will be opened Sept. 12 for building a bridge over the Ottawa river in Sugar creek twp. Co. comrs.

Jefferson City, Mo.—The county court is considering a petition for the construction of a bridge across the Moniteau river.

Accotink, Va.—Bids are asked until Sept. 5 for constructing an iron bridge over Accotink river. A. B. Lukens, chrm. com.

San Jose, Cal.—Bids will be received until Sept. 6 for building a bridge over Stevens creek. Geo. E. Rea, chrm. bd. suprs.

Westfield, Mass.—The county commissioners have ordered the town to build a new iron or steel bridge over Little river.

Chicago, Ill.—Plans are being drawn for three new bridges over the north branch of the Chicago river. Cy. Engr. Erickson.

Aitken, Minn.—The Wrought Iron Bridge company, Canton, O., was awarded the contract for rebuilding the Knox street bridge for $1,993.

Freeport, Ill.—The Wrought Iron Bridge company, Canton, O., was awarded the contract for building two bridges in Harlem twp. for $700.

Trenton, Mo.—Bids will be received for reconstructing and constructing wood or iron bridges. P. S. Vannatta, deputy br. comr.

Chicago, Ill.—Sealed proposals will be received until Oct. 5 for erecting certain bridge substructures. James Reddick, clk. bd. trustees.

Des Moines, Ia.—The city council has been petitioned to construct a bridge over the Des Moines river, from E. Sixth-st. to the south side.

Wausau, Wis.—Sealed proposals will be received until Sept. 5 for building a steel bridge across the Wisconsin river. Frank Ross, chrmn.

Pelham, N. Y.—The town board is considering the feasibility of building three new bridges over the Hutchison river, between this town and Mt. Vernon.

Elberton, Ga.—The county commissioners have decided to build a bridge over Broad river, between Elbert and Wilkes counties. J. W. McCabe, chrmn. com.

Choteau, Minn.—Sealed proposal will be received until Sept. 6 for building a steel or iron bridge over the Marias river. A. C. Warner, co. clk.

Mountainhome, Idaho.—Bids will be received until Sept. 13 for moving and repairing the bridge over South Boise river at Pine Grove. W. H. Manion, clk.

Mt. Vernon, N. Y.—The council contemplates building bridges on S. Fulton and E. Lincoln-aves. and E. Third and E Sixth-sts. Edwin W. Fiske, mayor.

Cincinnati, O.—Bids will be received until Sept. 20 for building a railroad viaduct across the valley of Lick run. Bd. of trustees, comrs. of w. w.

Eau Claire, Wis.—An ordinance has been passed providing for a special election Sept. 6 to vote on the issue of $40,000 bonds for the construction of a new steel bridge.

Pittsfield, Mass.—A petition is being considered by the city council again asking for a new bridge across the river at South-st. to replace the one blown down.

Warren, Pa.—Bids are asked until Sept. 7 for plans for a bridge over Mill Race, and until Sept. 12 for constructing the same. L. T. Borchers, chrmn. co. comrs.

Seattle, Wash.—Bids will be received until Sept. 3 for the construction of a bridge on Road No. 71, over the Sammamish River, near Woodinville. E. H. Everson, clk. co. comrs.

New Philadelphia, O.—The Wrought Iron Bridge company, Canton, O., was awarded the contract July 28 for building the iron substructure over the Tuscarawas river for $9,500.

PARKS.

Augusta, Ga.—The question of establishing a public park is under consideration by the council.

Indianapolis, Ind.—This city has completed nearly all of the proposed purchases for park lands.

Westerly, R. I.—The question of securing land for the establishment of a park is being strongly urged.

Memphis, Tenn.—This city has purchased Winchester cemetery and will transform it into a park. Mayor Williams.

Detroit, Mich.—The park commissioners have granted a petition for improvements in Owen Park, Clark Park and Palmer Park.

Newark, N. J.—The Essex Park commissioners will expend most of the money realized from the sale of $500,000 worth of bonds in finishing up the work at Branch Brook and developing the west side and the Orange Parks.

Baltimore, Md.—The improvements and development at Cliften park are being rapidly pushed under Superintendent Noah F. Flitton. Owing to its natural beauty the park is destined to become a great pleasure resort for the public.

Butte, Mont.—Jas. H. Lynch, Henry Mueller and Chas. Schatzlein have been appointed a committee to solicit subscriptions for the purchase of the Columbia gardens. If successful the gardens will be converted into a park.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Hazleton, Pa.—The question of garbage disposal is being considered by the council.

Cincinnati, O.—Mayor Hall, at Ft. Thomas, has recommended a crematory.

Knoxville, Tenn.—The erection of a garbage plant is contemplated.

Quincy, Ill.—The question of street sprinkling is being considered by the municipality.

Portchester, N. Y.—The question of garbage disposal, waste, etc., is being considered.

Bay City, Mich.—The question of securing a garbage disposal plant is under consideration.

Hagerstown, Md.—This city is considering the question of establishing a garbage disposal system.

Wilmington, Del.—The contract for removing ashes for the year, from Sept. 1, has been awarded to Jos. B. Stidham for $7,200.

Rochester, N. Y.—The board of health will again, according to press reports, consider the question of garbage disposal.

Utica, N. Y.—The council has passed over the mayor's veto the ordinance awarding the garbage contract to Henry Staffenbach at $6,500 a year for 10 years.

Saginaw, Mich.—Acocrding to press reports this city is in need of street cleaning appliances, such as sweepers, bags, scrapers, etc. J. J. Weale, supt. pub. wks.

Jersey City, N. J.—The City Refuse Utilization company has been incorporated to remove and utilize city, street and house refuse. Herbert Tate, Wm. W. Meen, incorporators.

Atlantic City, N. J.—The contract for collecting and removing the garbage for the next five months has been awarded to Sylvester Leeds for $4,400, and the contract for removing the garbage from the city wharf in scows has been awarded to Wallace Smith at 50 cents per ton of 2,240 lbs.

Los Angeles, Cal.—The new specifications under which bids will be advertised for street sweeping have been completed. Bids will be asked under three plans: 1—sweeping all streets by machines. 2—Sweeping business district by hand. 3—Sweeping all parts of the city outside a given business area by machines. Chrmn. Toll.

Milwaukee, Wis.—Bids were received, Aug. 12, for furnishing and installing a garbage disposal plant, as follows: Eagle Sanitary and Crematory company, $52,500 and $63,500; F. C. Gross and Joseph Schaaf, $58,500; F. H. Kratzer, $53,700; Dixon Garbage Crematorory company, $58,000; Gorman Bros., $61,000; Jacob Jacobi, $79,019.

Warner Stutler, superintendent of street and alley cleaning in the District of Columbia, has mailed copies of his annual report on the success of hand labor to the street and alley cleaning departments of all the principal cities in the country, with requests for similar information in return. He has also asked for data upon the removal of ashes at public expense.